Attachment E

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Attachment F

Attachment G

Part I.B Changes – Additional Limitations and Monitoring Requirements for the Discharge System (2007 Permit):		
From	**To**	**Rationale**
[illegible]	[illegible]	[illegible]

Part I.C Changes – Other Requirements or Special Conditions for the Discharge System (2007 Permit):		
From	**To**	**Rationale**
[illegible]	[illegible]	[illegible]

Part I.D Changes – Land Treatment System (2007 Permit):

Parameter Changed	Discharge Limitations Changed		Monitoring Requirements Changed	Rationale
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Part I.E Changes – Land Treatment System (2007 Permit):

Parameter Changed	Discharge Limitations Changed		Monitoring Requirements Changed		Rationale
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Part I.F Changes – Land Treatment System (2007 Permit):

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Part I.G Changes – Land Treatment System (2007 Permit):

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Part I.H Changes – Land Treatment System (2007 Permit):

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Part I.I Changes – Other Requirements or Special Conditions of the Land Treatment System (2007 Permit):

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Part II Changes:		
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[illegible] *The Rappahannock Record*

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Attachment A

Facility Flow Diagrams

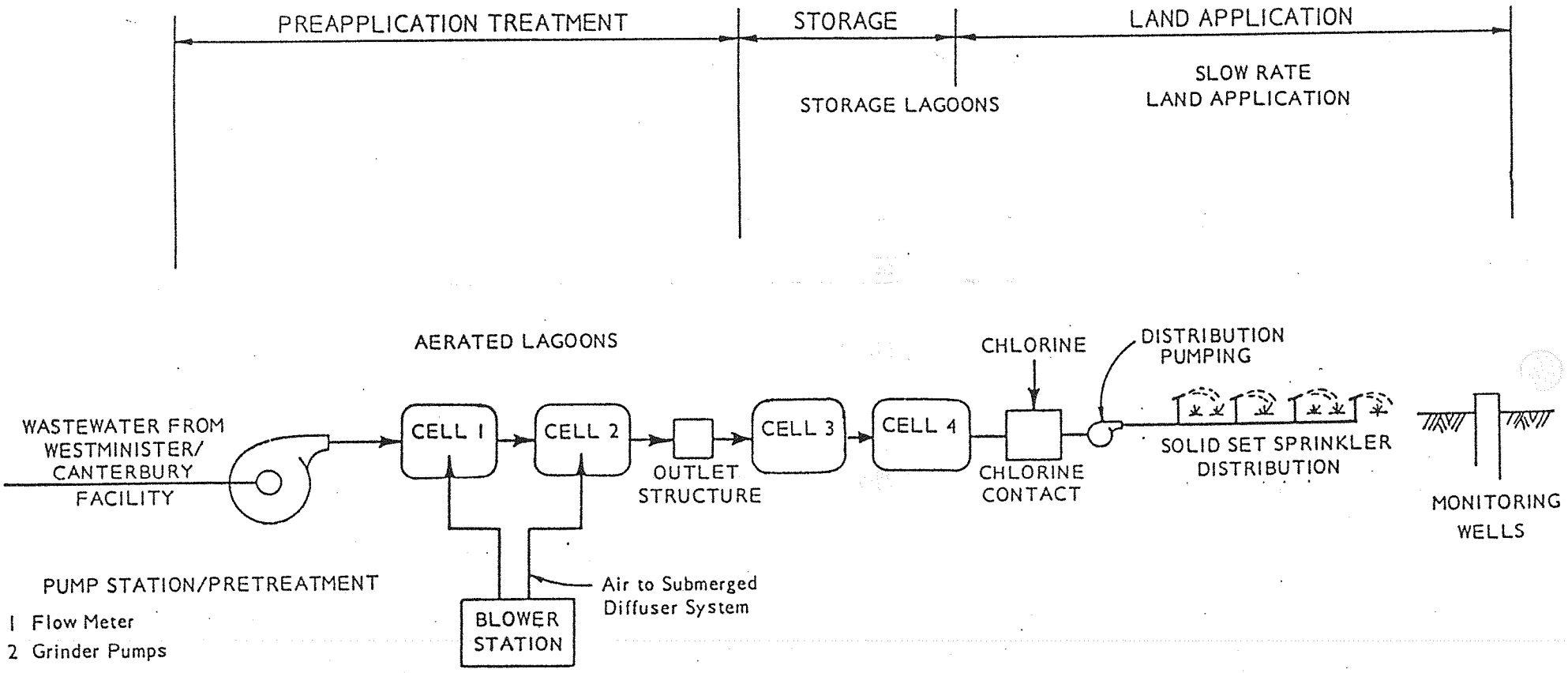

EXHIBIT 2

	CHK	RAPPAHANNOCK WESTMINSTER/ CANTERBURY
	REVISION	Figure 2 FLOW SCHEMATIC
	DESIGN BJ	JOHN McNAIR & ASSOCIATES CONSULTING ENGINEERS WAYNESBORO, VIRGINIA
	DRAWN BY RJD	
	APPROVED	
	DATE	
	NO SCALE AS NOTED	PROJECT NUMBER SHEET
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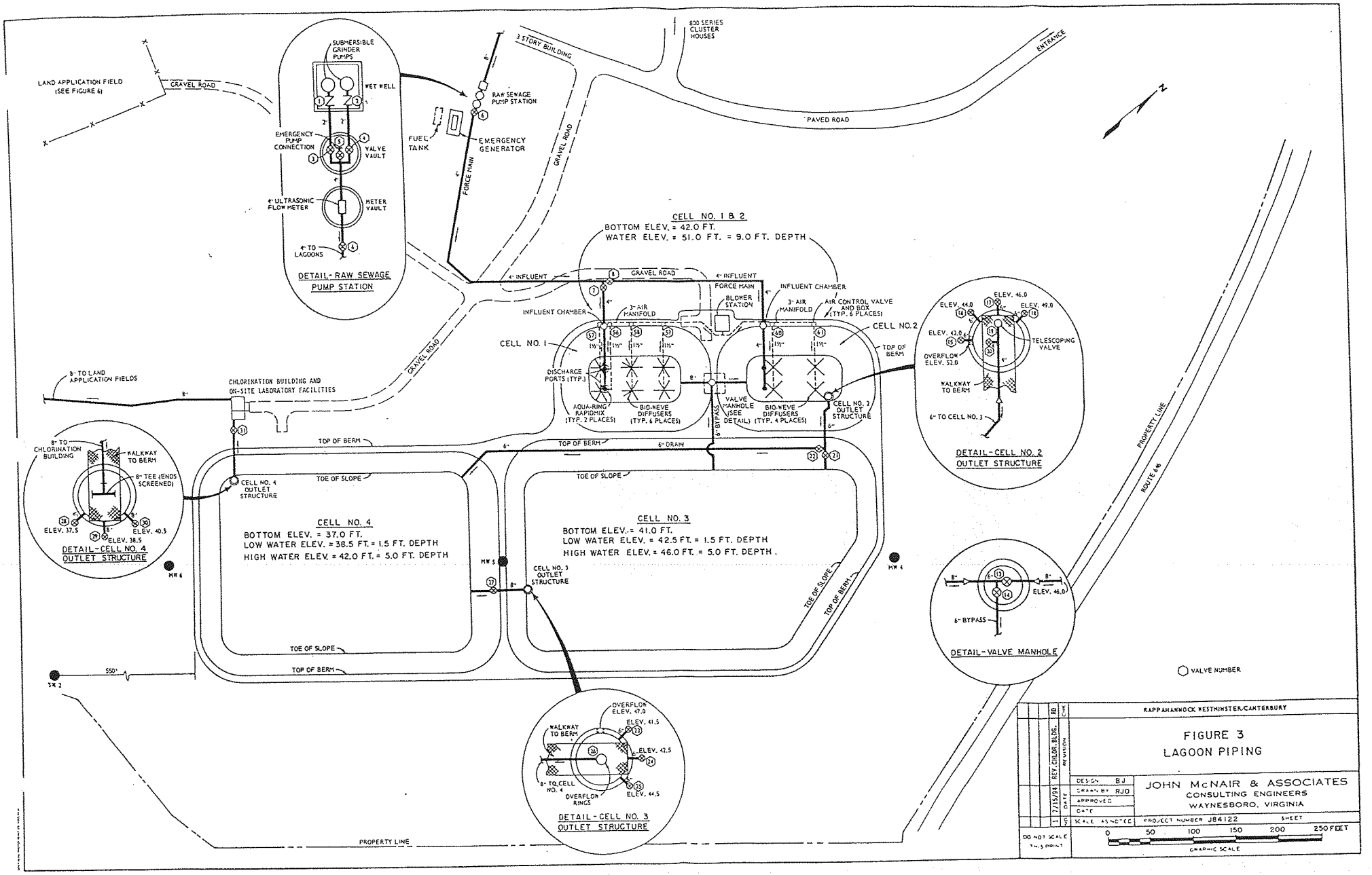

RAPPAHANNOCK WESTMINSTER/CANTERBURY

FIGURE 3
LAGOON PIPING

NO.	DATE	REVISION	BY
1	7/15/94	REV. CHLOR. BLDG.	RD

DESIGN BJ
DRAWN BY RJD
APPROVED
DATE
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PROJECT NUMBER J84122
SHEET

JOHN McNAIR & ASSOCIATES
CONSULTING ENGINEERS
WAYNESBORO, VIRGINIA

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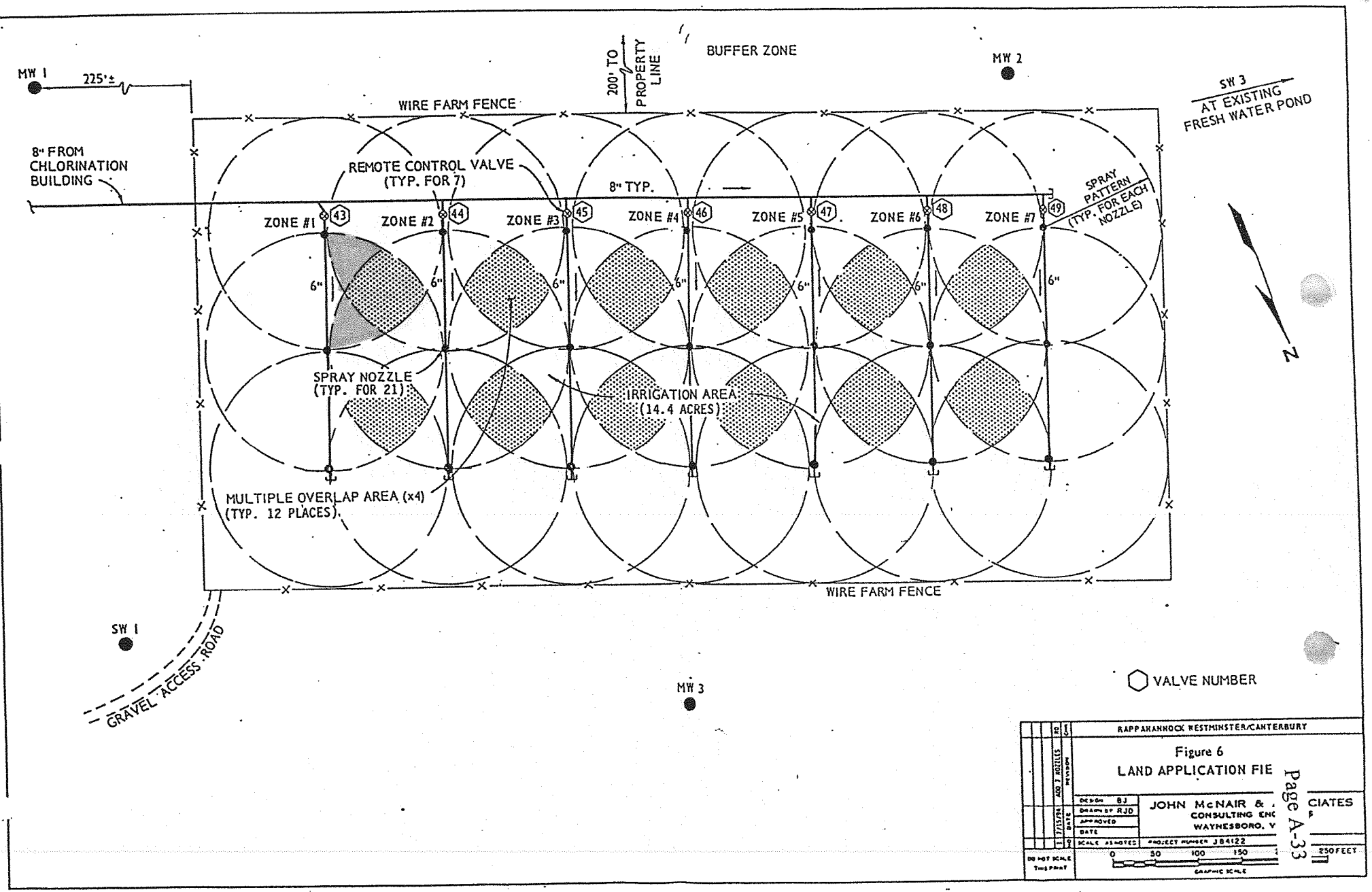
MW 1
225'±
200' TO PROPERTY LINE
BUFFER ZONE
MW 2
SW 3
AT EXISTING FRESH WATER POND
WIRE FARM FENCE
8" FROM CHLORINATION BUILDING
REMOTE CONTROL VALVE (TYP. FOR 7)
8" TYP.
SPRAY PATTERN (TYP. FOR EACH NOZZLE)
ZONE #1
ZONE #2
ZONE #3
ZONE #4
ZONE #5
ZONE #6
ZONE #7
43
44
45
46
47
48
49
6"
SPRAY NOZZLE (TYP. FOR 21)
IRRIGATION AREA (14.4 ACRES)
MULTIPLE OVERLAP AREA (x4) (TYP. 12 PLACES)
WIRE FARM FENCE
SW 1
GRAVEL ACCESS ROAD
MW 3
N
VALVE NUMBER
RAPPAHANNOCK WESTMINSTER/CANTERBURY
Figure 6
LAND APPLICATION FIE
JOHN McNAIR &
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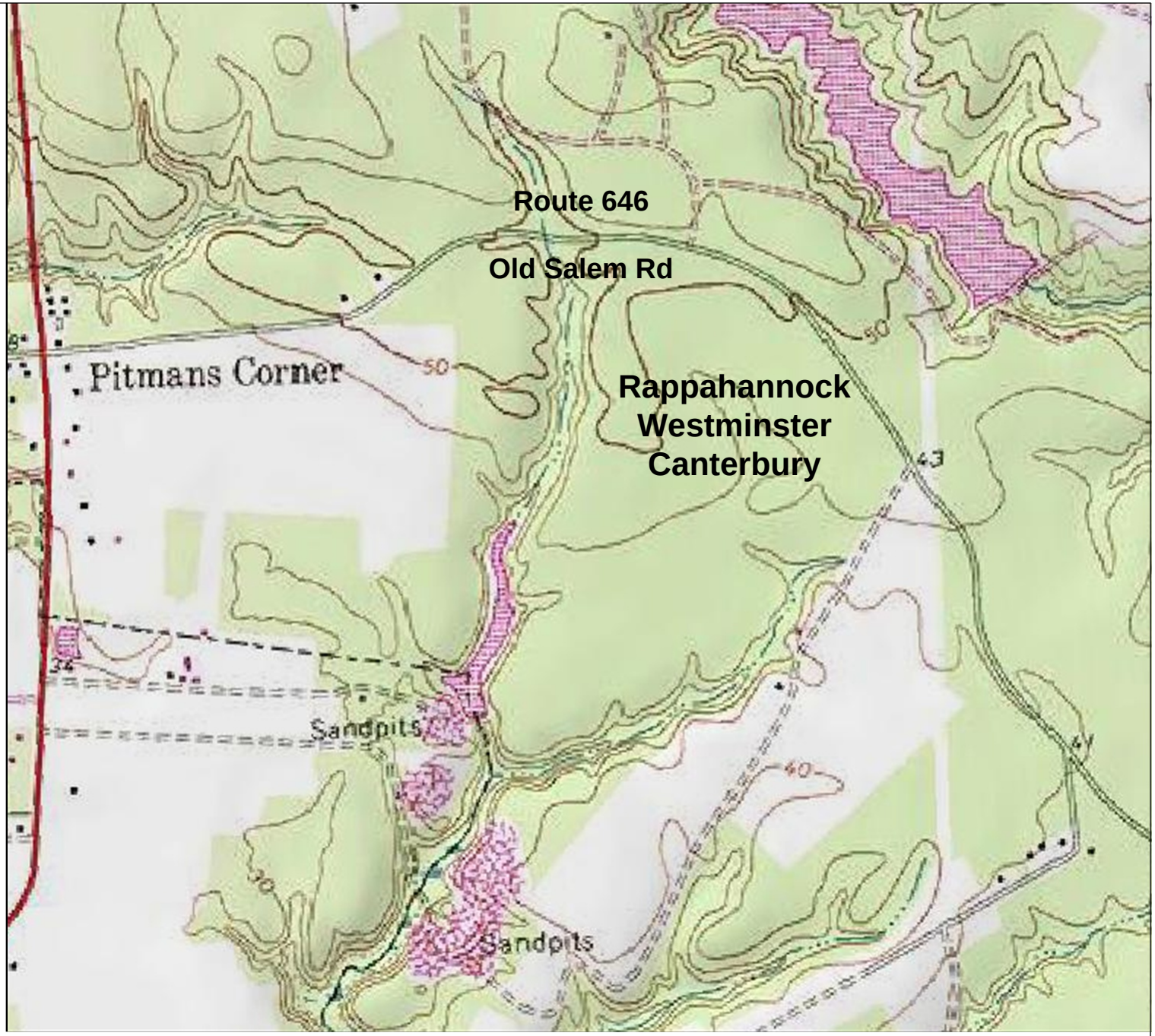
Attachment B

Topographic Map & Aerial Photograph

Map Export

Legend



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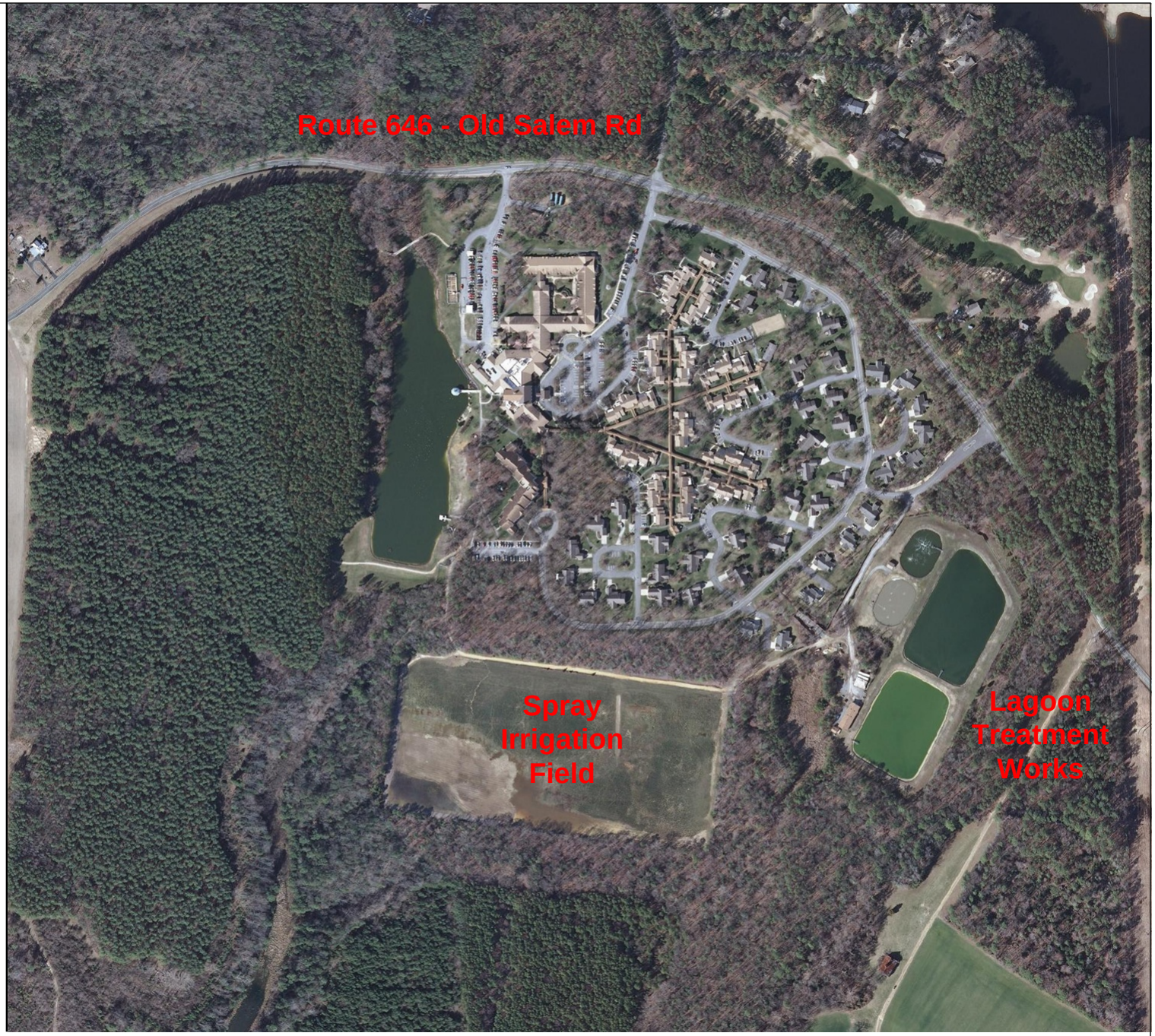

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Map Scale: 1:6,000

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Attachment C

Site Inspection Report

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Piedmont Regional Office

WASTEWATER FACILITY INSPECTION REPORT

FACILITY NAME:	Rappahannock Westminster-Canterbury	**INSPECTOR:**	Heather A. Horne
PERMIT No.:	VA0091511 (formerly VPA01401)	**INSPECTION DATE/TIME:**	June 26, 2007 (1018 – 1139 hrs.)
TYPE OF FACILITY:	Municipal - Land Application	**REPORT COMPLETED:**	July 10, 2007
COUNTY/CITY:	Lancaster	**UNANNOUNCED INSPECTION:**	No
REVIEWED BY:			
PRESENT DURING INSPECTION:	Mr. Kent Cuthbertson and Meredith Williams (DEQ)		

I. OPERATIONAL UNIT REVIEW AND CONDITION:

Influent Pump Station: The station/wet well, receives domestic wastewater (gravity flow) from the facilities (~695 residents and employees). The station is equipped with two grinder pumps (set in lead/lag mode), and an in-line magnetic flow meter. Since the previous inspection, one grinder pump was replaced and the other was rebuilt. Calibration was last performed on 2/1/07 by Enviromation, Inc., Ashland, VA. An auto dialer (to the main office) and visual alarm signals indicate a high-liquid level condition in the wet well – both were fully operable. Influent flow is a permitted parameter. Wastewater is pumped to two aerated lagoons. The station well has a history of grease accumulation. A degreaser is added at the pump station to help with this problem. Grease was observed at the time of inspection. Reportedly, grease is pumped out approximately once per quarter by a contractor.

Aerated Lagoons (Lagoon Nos. 1 & 2): The entrance gate to the lagoon was closed and locked. The facility maintains two aerated lagoons, which were being operated in series at the time of the inspection. The lagoons may be isolated at a common portal valve. Each lagoon is equipped with "aqua ring" fine bubble diffusers. Air is provided by two dedicated blowers. The aeration cycle is continuous, and the blowers are alternated daily. The diffusers in cell 1 and cell 2 have been replaced since the last inspection. The wastewater had a greenish-brown tint. The No. 2 Lagoon is equipped with a riser discharge structure. Duckweed was present in cell 2; a screen is used to keep duckweed out of tower. Both lagoons had approximately 24 inches of freeboard (Permit requirement is two feet minimum for all of the lagoons). Plant records include daily freeboard measurements. Retention time in these lagoons is approximated to be 30 days.

Unaerated Lagoons (Lagoon Nos. 3 & 4): Wastewater flows, via gravity, to two unaerated lagoons. These lagoons are also operated in series. Each lagoon is equipped with a discharge riser structure (valve controlled) to which staff gauges are installed. Cell 3 had 32 inches of freeboard. Cell 4 had 33 inches of freeboard. Retention time in these lagoons is approximated to be 89 days. The wastewater in both lagoons had a greenish color. Overall, the berms structural integrity appeared to be good. A few rodent holes were noted on the berm. Mr. Cuthbertson eradicates burrowing animals as necessary. Landscaping staff are responsible for mowing all berms. A large number of waterfowl were observed on the berms. Although, vegetation was present, some bare areas were observed. This appeared to have been caused by foraging waterfowl.

Disinfection: Wastewater flows by gravity from Lagoon No. 4 to a chlorine contact tank. Sodium hypochlorite solution (12.5% solution) is drip-fed by peristaltic pump at the head of the baffled contact tank. A new dosing pump was installed since the last inspection. The solution is stored in two (a 120-gallon capacity and a 500-gallon capacity) stand-alone carboys. There is no secondary containment available for the carboys, but it was indicated that the floor drain would return spilled liquid to the contact tank. Operator expressed concern about the floor in the Chlorine Building being cracked due to corrosion. When conditions are conducive for land application, disinfected wastewater is pumped from the tank to the Land Application Field. Two manually controlled pumps are maintained for this purpose. An in-line magnetic (flow) meter is used to measure flow to the land application system. The meter was last calibrated 2/1/07 by Enviromation, Inc., Ashland, VA. There was no discharge from the contact tank to the Land Application Field during the inspection.

I. OPERATIONAL UNIT REVIEW AND CONDITION CONTINUED:

Land Application Field: Wastewater is conveyed via subsurface piping to a 14.5 acre Spray Application Field. The Field is divided into seven zones (Zones 1 - 7). Each Zone is equipped with three fixed spray applicators. New misting spray heads have been installed. Kentucky 31 Tall Fescue and Reed Canary grass is maintained as the cover crop. At the time of the inspection, the application field was dry and the grass was approximately 10 inches tall. 456 bales of hay were removed from the field during the week prior to inspection. The inspectors observed a low spot in the field caused by past hydraulic overloading. This area has improved; some vegetation was observed. This area still does not support crop growth and reportedly collects water during significant rain events. There is a hole in the field, in Zone 3, that the operator suspected was a break in the pipe. This hole reportedly fills with water when land applying.

II. ULTIMATE DISPOSAL OF SOLIDS:

Solids are settled out in the four lagoons. It was estimated that lagoon one contains approximately 10 inches of sludge. The facility has received the new VPDES discharge permit but has not made any decisions regarding the continued use of the lagoons or the removal of solids. The facility is operating under the no discharge provisions of the new VPDES permit.

III. FIELD DATA:

There was no discharge to (or from) the land application field at the time of this inspection. Prior to this inspection the previous date of land application was 5/22/07.

IV. PLANT OPERATIONS AND MAINTENANCE:

Operations and Maintenance Manual:	The Operations and Maintenance Manual was briefly reviewed March 22, 2002. The Manual appeared to be complete and up-to-date (August 4, 1994 revision).
Class and Number of Licensed Operators:	A Class III operator is required. A licensed operator is under contract to make operational control decisions and to fulfill the operator requirement. Following the inspection, Mr. Cuthbertson completed the licensure exam and is now a Class III operator.
Alarm Systems and Alternate Power:	Alarm signals are checked monthly. A backup generator (tested weekly) and portable pump are maintained for continuous operability. The generator is tested weekly, and was reported to be fully operational. The alarm signal at the Influent Pump Station was operational.
Any bypassing since last inspection?	No
When was the RPZ device last checked?	August 2006
Name, number and description of pump stations:	Influent Pump Station and the Land Application/Chlorine Contact Tank Pump Station

V. COMMENTS:

Groundwater infiltration was suspected to be the cause of high flows to the plant. A smoke test was performed on the sewerage system to determine where the groundwater infiltration problem was occurring. The operator reported that the problem was located and is in the process of being fixed. Incoming flows had already decreased from 24,000 gallons/day to 15,000 gallons/day.

The facility maintains six groundwater monitoring wells (GW-1 through GW-6). Wells were not viewed during this inspection.

Operational logs include the "Land Application Field, Wastewater Treatment Plant Log, the Daily Operational Log and the Raw Sewage Lift Station" forms, and a written log. The forms and the logs were not reviewed during the inspection. Operations and maintenance activities appeared to be up-to-date. Daily rainfall measurements are recorded.

This facility previously operated under VPA permit number VPA01401. Because there are plans to build a wastewater treatment plant, the permit was reissued under VPDES permit number VA0091511. Until the plant is built, the facility will continue to land apply treated wastewater. There are provisions in the new permit that allow for land application to continue.

A full laboratory inspection was not conducted during this inspection. Inspectors viewed the operator's equipment and reagents while on site. A detailed inspection of paperwork was not conducted at this time (a full laboratory inspection was conducted June 6, 2006). The May 2, 2007 groundwater report was reviewed and the nitrate and ammonia results were within limits. The equipment was in good working order and reagents and standards were all their within expiration dates. A new gel pH probe was in use. The thermistor in the pH meter needs to be checked against a NIST certified thermometer annually. The laboratory was clean and well taken care of. The operator seems to be well organized and have all paperwork complete.

VI. GENERAL RECOMMENDATIONS:

1. As a reminder, should the minimum freeboard requirement not be met the DEQ must be notified immediately, followed up by a written report within five days.
2. There was an abundance of geese present during the inspection. Animals, such as geese, should not be encouraged to reside in the wastewater cells. Geese should not be fed at the wastewater treatment facility.
3. If the facility intends to continue using the lagoons and land application field, funding for the following projects should be considered:
   - Sludge in the lagoons has never been removed. The solids in cells 1 and 2 will need to be removed in the near future.
   - The land application field will need to be repaired. The field needs to be leveled so water does not pond in the low spot.
   - The operator expressed some concern regarding the floor of the chlorine building. The floor is cracking due to corrosion caused by chlorine. Due to safety precautions, this may need to be replaced in the future.
4. Continue to monitor aeration equipment in Cells 1 and 2 to ensure that it is operating correctly.
5. Continue to monitor and remove grease in the pump station as necessary.

VII. COMPLIANCE RECOMMENDATIONS/REQUEST FOR CORRECTIVE ACTION:

1. The break in the pipe in Zone 3 of the land application field must be repaired. Once repaired, the area must be filled, graded properly, and reseeded.
2. The thermistor in the pH meter must be checked against a NIST certified thermometer annually. Please record this verification date for inspectors to review.
3. Monitoring is being submitted on incorrect forms. Please discontinue the use of expired VPA report forms and begin reporting on the proper VA0091511 forms.

Copies:
DEQ - OWPS (S. Stell)

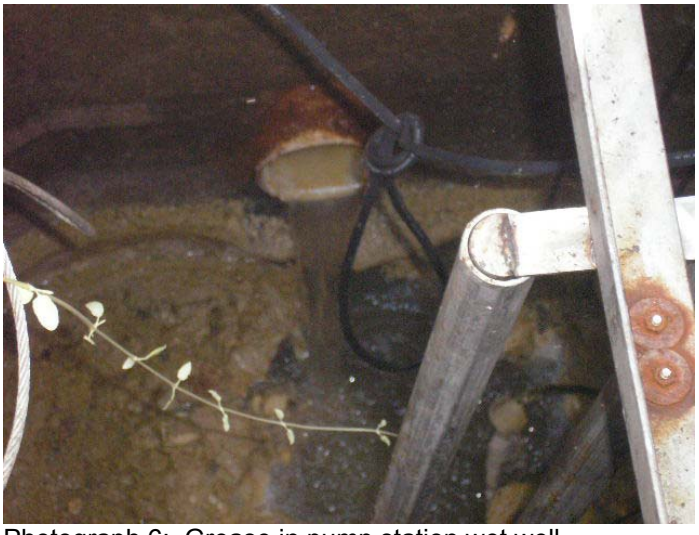
Photograph 1: Cell 4

Photograph 2: Cell 1 (diffuser)

Photograph 3: Waterfowl on berm between Cells 3 and 4

Photograph 4: New misting spray head

Photograph 5: Low spot in need of repair in land application field



Photograph 6: Grease in pump station wet well

Attachment D

Land Application Site Area Verification Calculations

Rappahannock Westminster-Canterbury WWTF

Land Application Site Area Verification Calculations
(Virginia Pollutant Abatement Technical Manual)

1. Land Area Required based upon Design Flow & Most Restrictive Irrigation Rate:

Design Flow = 50,000 gal/d

Irrigation Rate = 0.25 in/hr
= 1.0 in/d
= 2.0 in/wk **(most restrictive irrigation rate)**

$$\text{Land Area Required} = \frac{\left(50{,}000\ \frac{\text{gal}}{\text{d}}\right)\left(7\ \frac{\text{d}}{\text{wk}}\right)\left(3.684 \times 10^{-5}\ \frac{\text{ac-in}}{\text{gal}}\right)}{2.0\ \frac{\text{in}}{\text{wk}}} = 6.4 \text{ acres}$$

2. Land Area Required based upon Design Flow, Precipitation, Evapotranspiration, Percolation, and Runoff:

$$P + W = E + D + R$$

Where: P = precipitation, in/yr
W = wastewater application, in/yr
E = evapotranspiration, in/yr
D = percolation through soil profile, in/yr
R = surface runoff, in/yr (assumed to be zero)

P – E = 3 in/yr (as reported in the DCR approved NMP)

D = 31.79 in/hr (as reported by the permittee in the 2010 Annual Report)

According to the VPA Technical Manual, percolation values should not exceed 20-25% of the saturated percolation value. Consequently, the percolation rate will be adjusted accordingly.

$$W = D - (P - E)$$

$$W = \left(31.79\ \frac{\text{in}}{\text{hr}}\right)\left(8{,}760\ \frac{\text{hr}}{\text{yr}}\right)(0.20) - 3\ \frac{\text{in}}{\text{yr}} = 55{,}693\ \frac{\text{in}}{\text{yr}} = 1{,}071\ \frac{\text{in}}{\text{wk}}$$

Since the allowable wastewater application (1,071 in/wk) is greater than the most restrictive irrigation rate (2.0 in/wk), it is anticipated that the system is not hydraulically limited.

$$\text{Land Area Required} = \frac{\left(50{,}000\ \frac{\text{gal}}{\text{d}}\right)\left(7\ \frac{\text{d}}{\text{wk}}\right)\left(3.684 \times 10^{-5}\ \frac{\text{ac-in}}{\text{gal}}\right)}{1{,}071\ \frac{\text{in}}{\text{wk}}} = 0.01 \text{ acres}$$

3. Land Area Required based upon Design Flow and Plant Available Nitrogen (PAN) effluent concentration, Method I:

Design Flow = 50,000 gal/d = 18.25 MG/yr = 18,250 kgal/yr

PAN Uptake = 90 lb/ac/yr (as reported in the DCR approved NMP)

According to the VPA Technical Manual, approximately 130% of the PAN uptake value can be used to estimate nitrogen assimilative pathways when the crop is harvested and removed from the site.

Effluent PAN Concentration = 0.01 lb/kgals (as reported in the DCR approved NMP)

$$\text{PAN Applied} = \left(0.01\ \frac{\text{lb}}{\text{kgal}}\right)\left(18{,}250\ \frac{\text{kgal}}{\text{yr}}\right) = 183\ \frac{\text{lb}}{\text{yr}}$$

$$\text{Land Area Required} = \frac{183\ \frac{\text{lb}}{\text{yr}}}{(1.3)(90\ \frac{\text{lb}}{\text{ac-yr}})} = 1.6 \text{ acres}$$

4. Land Area Required based upon Design Flow and Plant Available Nitrogen (PAN) effluent concentration, Method II:

$$L_N = U + D + V + (2.7)(C_d)(L_W + P - E)$$

Where: L_N = allowable assimilative capacity, lb/ac/yr
U = crop uptake, lb/ac/yr (90 lb/ac/yr as reported in NMP)
D = denitrification, lb/ac/yr (assumed to be $0.1L_N$)
V = volatilization, lb/ac/yr (assumed to be zero)
L_W = wastewater hydraulic loading, ft/yr
P = precipitation, ft/yr
E = evapotranspiration, ft/yr
C_d = percolate nitrogen concentration, mg/L
(5 mg/L; ground water standard for nitrate-nitrogen)

$$L_W = \left(50{,}000\ \frac{\text{gal}}{\text{d}}\right)\left(365\ \frac{\text{d}}{\text{yr}}\right)\left(3.684\text{x}10^{-5}\ \frac{\text{ac-in}}{\text{gal}}\right)\left(\frac{1}{14.5\text{ ac}}\right)\left(\frac{\text{ft}}{12\text{ in}}\right) = 3.86\ \frac{\text{ft}}{\text{yr}}$$

$$L_N = 90\ \frac{\text{lb}}{\text{ac-yr}} + 0.1L_N + (2.7)\left(5\frac{\text{mg}}{\text{L}}\right)\left(3.86\ \frac{\text{ft}}{\text{yr}} + 0.25\ \frac{\text{ft}}{\text{yr}}\right)$$

$$0.9L_N = 90\ \frac{\text{lb}}{\text{ac-yr}} + 56\ \frac{\text{lb}}{\text{ac-yr}}$$

$$L_N = 162\ \frac{\text{lb}}{\text{ac-yr}}$$

$$\text{Land Area Required} = \frac{183\ \frac{\text{lb}}{\text{yr}}}{162\ \frac{\text{lb}}{\text{ac-yr}}} = 1.1 \text{ acres}$$

5. Land Area Required based upon Design Flow and Total Phosphorus effluent concentration:

As a conservative measure it is assumed that the land application field's phosphorus fixation capacity has been reached and that no portion of the effluent phosphorus will be immobilized.

Effluent Total Phosphorus Concentration = 3.01 mg/L (as reported by the permittee in the 2012 permit reissuance application)

$$\text{Phosphate } (P_2O_5) \text{ Applied} = (2.27)\left(3.01\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 1{,}040\ \frac{lb}{yr}$$

P_2O_5 Uptake = 80 lb/ac/yr (as reported in the DCR approved NMP)

$$\text{Land Area Required} = \frac{1{,}040\ \frac{lb}{yr}}{80\ \frac{lb}{ac\text{-}yr}} = 13.0 \text{ acres}$$

6. Land Area Required based upon Design Flow and Total Potassium effluent concentration:

$$L_K = U + (2.7)(C_d)(L_W + P - E)$$

Where: L_K = allowable assimilative capacity, lb/ac/yr
U = crop uptake, lb/ac/yr (170 lb/ac/yr as reported in NMP)
L_W = wastewater hydraulic loading, ft/yr (3.86 ft/yr as calculated above)
P = precipitation, ft/yr
E = evapotranspiration, ft/yr
C_d = percolate nitrogen concentration, mg/L
(250 mg/L; drinking water taste threshold)

$$L_K = 170\ \frac{lb}{ac\text{-}yr} + (2.7)\left(250\ \frac{mg}{L}\right)\left(3.86\ \frac{ft}{yr} + 0.25\ \frac{ft}{yr}\right) = 2{,}947\ \frac{lb}{ac\text{-}yr}$$

Effluent Total Potassium Concentration = 16.20 mg/L (as reported by the permittee in the 2012 permit reissuance application)

$$\text{Potash } (K_2O) \text{ Applied} = (1.2)\left(16.20\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 2{,}959\ \frac{lb}{yr}$$

$$\text{Land Area Required} = \frac{2{,}959\ \frac{lb}{yr}}{2{,}947\ \frac{lb}{ac\text{-}yr}} = 1.0 \text{ acre}$$

7. Sodium Adsorption Ratio (SAR):

Effluent Sodium (Na) Concentration = 178.0 mg/L (as reported by the permittee)
Effluent Calcium (Ca) Concentration = 10.80 mg/L (as reported by the permittee)
Effluent Magnesium (Mg) Concentration = 1.29 mg/L (as reported by the permittee)

$$\text{Sodium Adsorption Ratio} = \frac{\frac{178.0\ \frac{mg}{L}}{23\ \frac{mg}{meq}}}{\sqrt{\frac{\frac{10.80\ \frac{mg}{L}}{20\ \frac{mg}{meq}} + \frac{1.29\ \frac{mg}{L}}{12\ \frac{mg}{meq}}}{2}}} = 13.60$$

According to the VPA Technical Manual, a maximum allowable SAR of 8-12 should be required for all wastes. Consequently, the 2012 permit will include a special condition requiring the permittee to develop a Cation Imbalance Plan in order to bring sodium into balance with calcium and magnesium, which will aid in the prevention of soil structure destruction.

8. Land Area Required based upon Design Flow and Total Recoverable Cadmium effluent concentration:

Effluent Total Recoverable Cadmium Concentration = <0.01 mg/L (as reported by the permittee)

$$\text{Cadmium Applied} = \left(0.01\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 1.52\ \frac{lb}{yr}$$

9VAC25-31-540.B.4 indicates that the annual cadmium loading rate shall be no greater than 1.9 kg/ha/yr or 1.7 lb/ac/yr.

$$\text{Land Area Required} = \frac{1.52\ \frac{lb}{yr}}{1.7\ \frac{lb}{ac\text{-}yr}} = 0.9 \text{ acres}$$

The WWTF has been operated from approximately 1984 to present or 28 years.

$$\text{Cadmium Applied to Date} = \left(0.01\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right)(28\text{ yr})\left(\frac{1}{14.5\text{ ac}}\right) = 2.9\ \frac{lb}{ac}$$

9VAC25-31-540.B.2 indicates that the cumulative cadmium loading rate shall be no greater than 39 kg/ha or 35 lb/ac.

9. Land Area Required based upon Design Flow and Total Recoverable Copper effluent concentration:

Effluent Total Recoverable Cadmium Copper = <0.02 mg/L (as reported by the permittee)

$$\text{Copper Applied} = \left(0.02\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 3.04\ \frac{lb}{yr}$$

9VAC25-31-540.B.4 indicates that the annual copper loading rate shall be no greater than 75 kg/ha or 66 lb/ac.

$$\text{Land Area Required} = \frac{3.04\ \frac{lb}{yr}}{67\ \frac{lb}{ac\text{-}yr}} = 0.05 \text{ acres}$$

The WWTF has been operated from approximately 1984 to present or 28 years.

$$\text{Copper Applied to Date} = \left(0.02\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right)(28\text{ yr})\left(\frac{1}{14.5\text{ ac}}\right) = 5.9\ \frac{lb}{ac}$$

9VAC25-31-540.B.2 indicates that the cumulative copper loading rate shall be no greater than 1,500 kg/ha or 1,338 lb/ac.

10. Land Area Required based upon Design Flow and Total Recoverable Lead effluent concentration:

Effluent Total Recoverable Lead Concentration = <0.05 mg/L (as reported by the permittee)

$$\text{Lead Applied} = \left(0.05\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 7.61\ \frac{lb}{yr}$$

9VAC25-31-540.B.4 indicates that the annual lead loading rate shall be no greater than 15 kg/ha/yr or 13 lb/ac/yr.

$$\text{Land Area Required} = \frac{7.61\ \frac{lb}{yr}}{13\ \frac{lb}{ac\text{-}yr}} = 0.6 \text{ acres}$$

The WWTF has been operated from approximately 1984 to present or 28 years.

$$\text{Lead Applied to Date} = \left(0.05\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right)(28\text{ yr})\left(\frac{1}{14.5\text{ ac}}\right) = 14.7\ \frac{lb}{ac}$$

9VAC25-31-540.B.2 indicates that the cumulative lead loading rate shall be no greater than 300 kg/ha or 268 lb/ac.

11. Land Area Required based upon Design Flow and Total Recoverable Nickel effluent concentration:

Effluent Total Recoverable Nickel Concentration = <0.02 mg/L (as reported by the permittee)

$$\text{Nickel Applied} = \left(0.02\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 3.04\ \frac{lb}{yr}$$

9VAC25-31-540.B.4 indicates that the annual nickel loading rate shall be no greater than 21 kg/ha/yr or 19 lb/ac/yr.

$$\text{Land Area Required} = \frac{3.04\ \frac{lb}{yr}}{19\ \frac{lb}{ac\text{-}yr}} = 0.2 \text{ acres}$$

The WWTF has been operated from approximately 1984 to present or 28 years.

$$\text{Nickel Applied to Date} = \left(0.02\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right)(28\text{ yr})\left(\frac{1}{14.5\text{ ac}}\right) = 5.9\ \frac{lb}{ac}$$

9VAC25-31-540.B.2 indicates that the cumulative lead loading rate shall be no greater than 420 kg/ha or 375 lb/ac.

12. Land Area Required based upon Design Flow and Total Recoverable Zinc effluent concentration:

Effluent Total Recoverable Zinc Concentration = 0.03 mg/L (as reported by the permittee)

$$\text{Zinc Applied} = \left(0.03\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right) = 4.57\ \frac{lb}{yr}$$

9VAC25-31-540.B.4 indicates that the annual zinc loading rate shall be no greater than 140 kg/ha/yr or 125 lb/ac/yr.

$$\text{Land Area Required} = \frac{4.57\ \frac{lb}{yr}}{125\ \frac{lb}{ac\text{-}yr}} = 0.04 \text{ acres}$$

The WWTF has been operated from approximately 1984 to present or 28 years.

$$\text{Zinc Applied to Date} = \left(0.03\ \frac{mg}{L}\right)\left(18.25\ \frac{MG}{yr}\right)\left(8.34\ \frac{lb\text{-}L}{mg\text{-}MG}\right)(28\text{ yr})\left(\frac{1}{14.5\text{ ac}}\right) = 8.8\ \frac{lb}{ac}$$

9VAC25-31-540.B.2 indicates that the cumulative lead loading rate shall be no greater than 2,800 kg/ha or 2,498 lb/ac.

Attachment E

Nutrient Management Plan

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION
203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-1712

9/20/2011

Scott Rae
2357 Burch's Mill Road
Urbanna, VA 23175

Re: Nutrient Management Plan Submission: 9/19/2011

Dear Mr. Rae

Your nutrient management plan for Rappahannock Westminster-Canterbury, Inc. biosolids applications on Stuart Bunting's Farm located in Lancaster County in watershed(s) RA73 has been approved by the Department of Conservation and Recreation. Please note that this letter should be kept with the nutrient management plan.

This plan is for Field 0/IrrigatedFalls2010 on Tract RWC, Inc. This approval is conditional upon site field conditions on the 14.5 acre hay field being as stated in the nutrient management plan. It should be noted that this plan expires on 12/31/2012. We recommend revising this nutrient management plan at least six months prior to the expiration date. Feel free to contact me should you have any questions concerning this letter.

Sincerely,

Rachel Barnes McAden
Environmental Specialist - Biosolids
Division of Stormwater Management
(804) 371-2762
rachel.mcaden@dcr.virginia.gov

cc:
DEQ Piedmont Regional Office

NUTRIENT MANAGEMENT PLAN IDENTIFICATION
For
RAPPAHANNOCK WESTMINSTER-CANTERBURY

Operator
Stuart Bunting
132 Lancaster Drive
Irvington, VA 22480
(804) 438-4021

Integrator:*None*

Farm Coordinates (UTMs)
Easting: 180376413, Northing: 4172579, zone: 17
[http://us.blackberry.com/mapgen/index.jsp?lat=37.67289&scr_z=0&lon=-76.40074&label=Canterbury+Dr%252C+Irvington%252C+VA%252C+USA%252C+22480&address=Canterbury+Dr&city=Irvington&region=VA&country=USA&postalCode=22480&z=0]

Watershed Summary
Watershed: RA73
County: Lancaster

Nutrient Management Planner
Scott Rae
2357 Burch's Mill Road
Urbanna, VA 23175
andrewscottrae@gmail.com
(804) 824-1466

Certification Code: 296

Acreage Use Summary
Total Acreage in this plan: 14.5
Hayland: 14.5

Biosolid Summary
Lagoon Effluent

	Imported	Produced	Exported	Used	Net
kgals	0.	10,438*	0.	19,575.	-9,137

Plan written 9/18/2011
Valid until 12/31/2012

Signature: A. Scott Rae Sept. 19, 2011

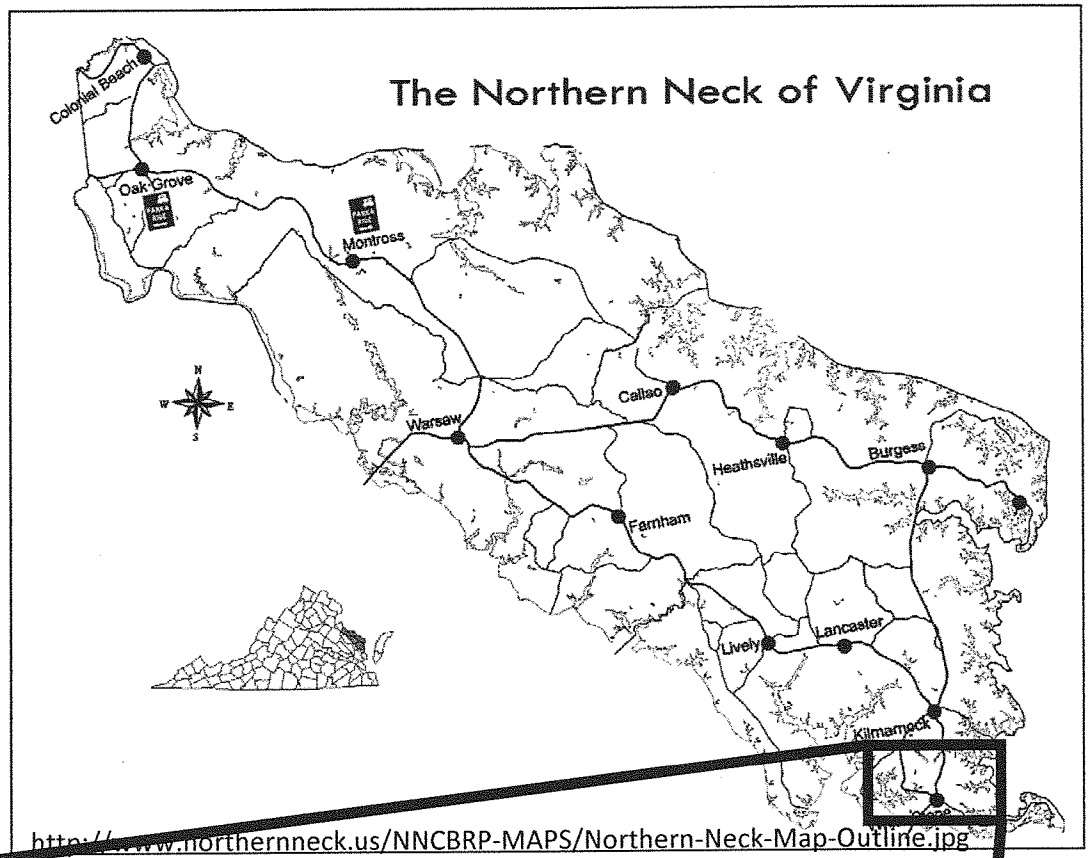
Planner **date**

***- produced and NPE**

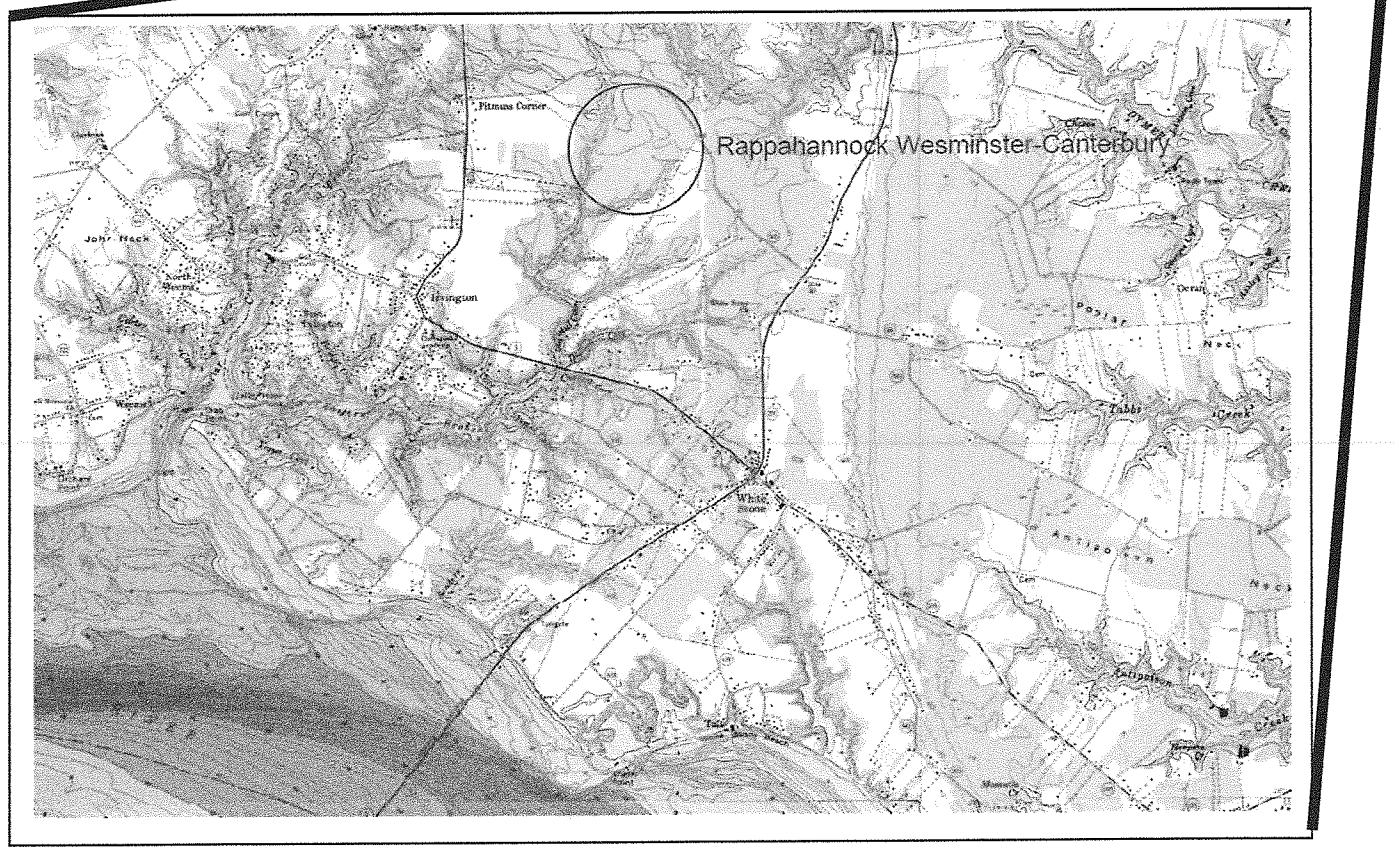
VICINITY MAP

Rappahannock Westminster-Canterbury

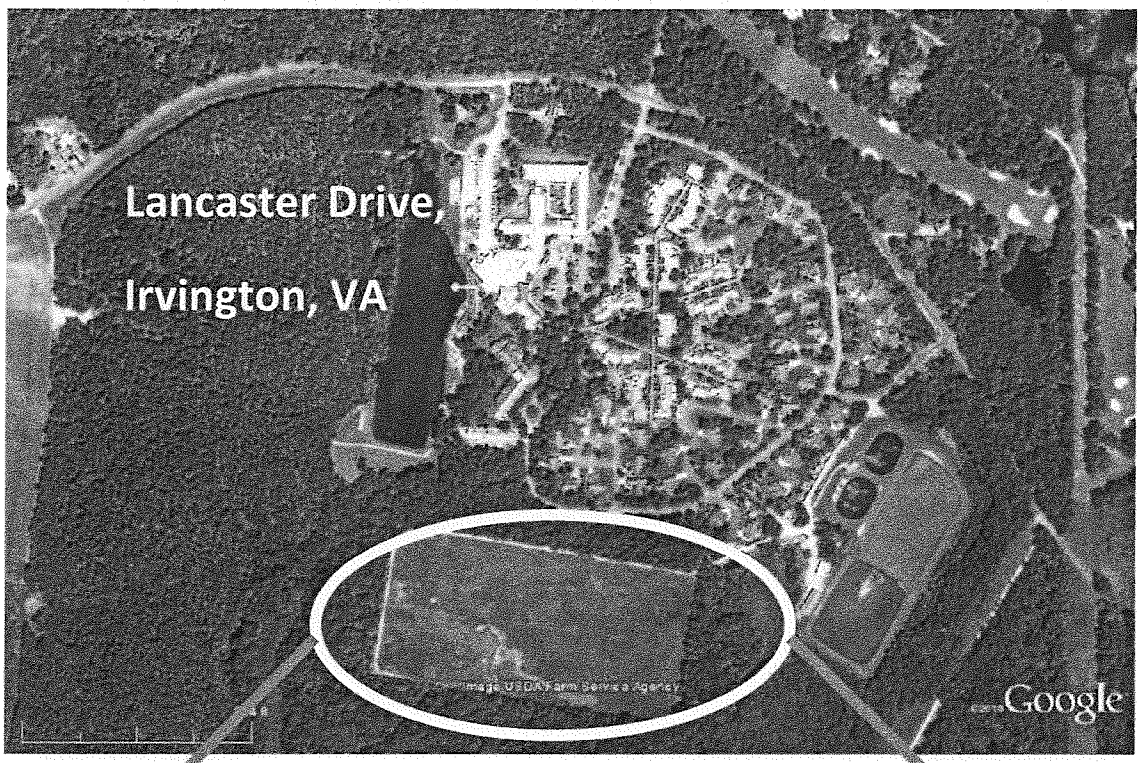
132 Lancaster Drive, Irvington, Virginia 22480



http://www.northernneck.us/NNCBRP-MAPS/Northern-Neck-Map-Outline.jpg

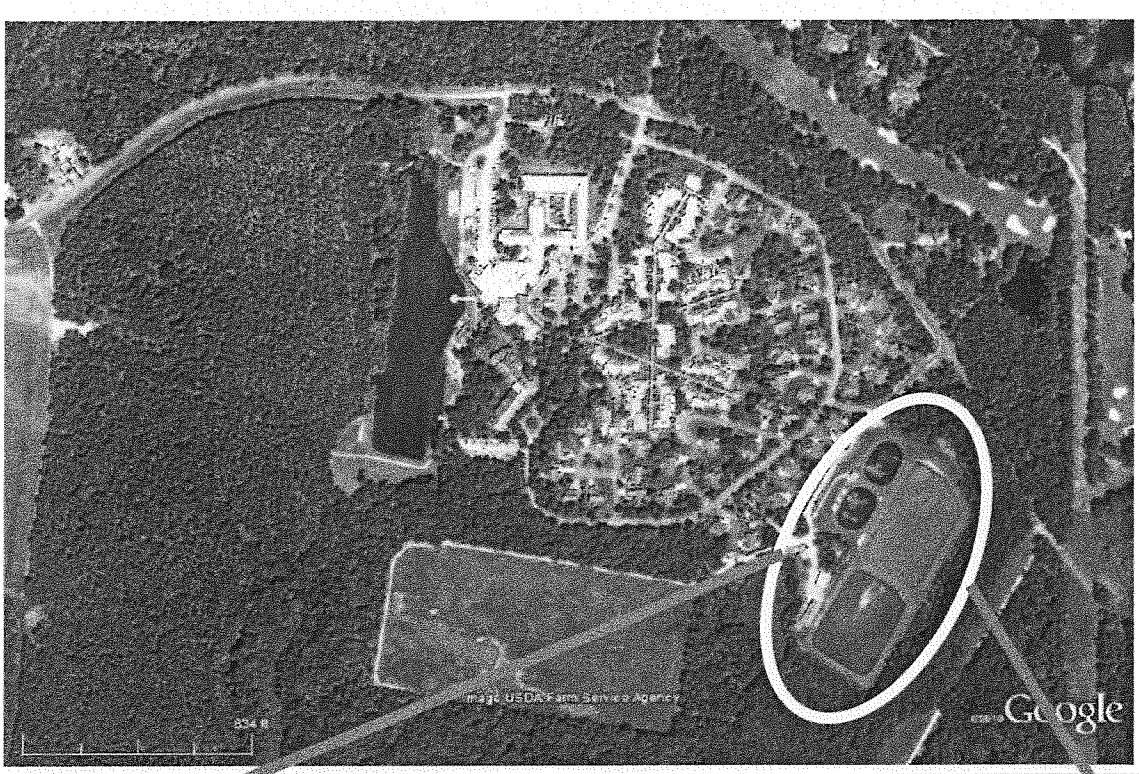


AERIAL IMAGE- Rappahannock Westminster-Canterbury
132 Lancaster Drive, Irvington, Virginia 22480

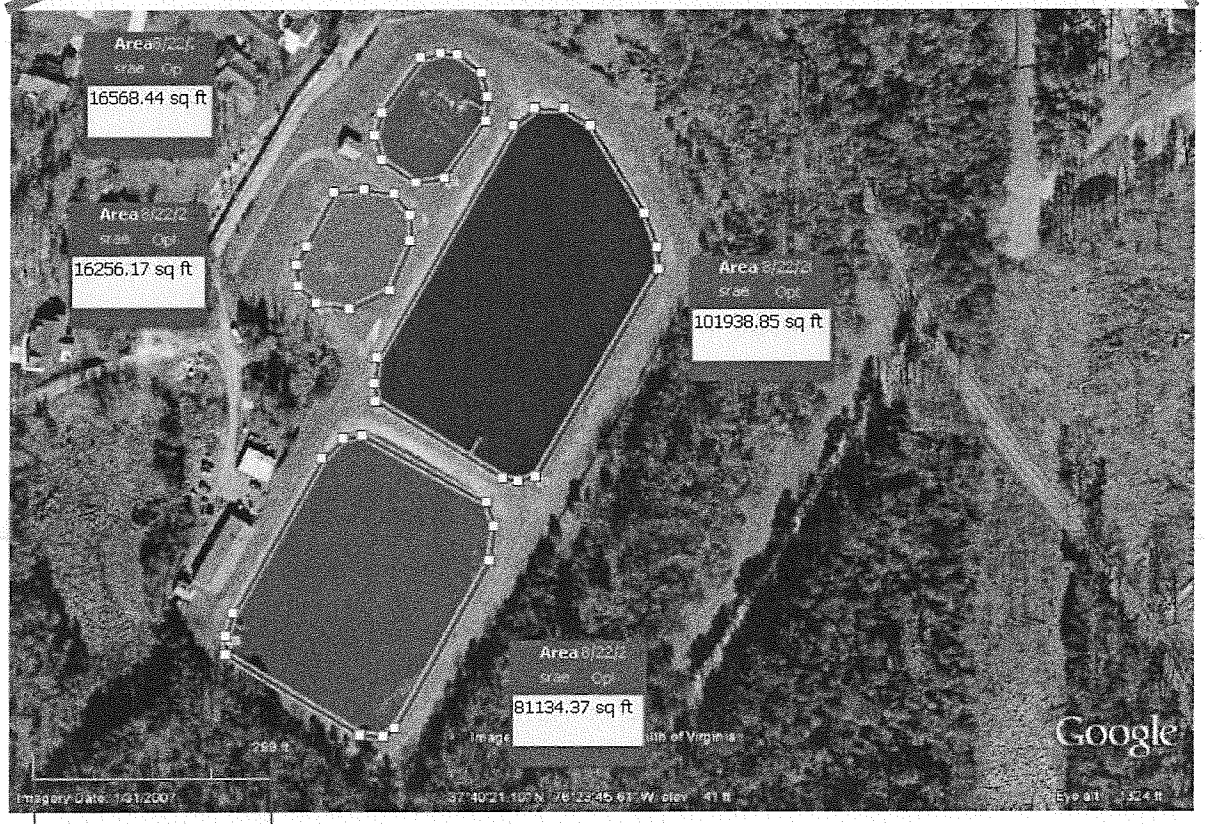


SOIL MAP OF HAYLAND (14.5 acres)
FOR IRRIGATION APPLICATION OF LAGOON EFFLUENT

AERIAL IMAGE- Rappahannock Westminster-Canterbury
132 Lancaster Drive, Irvington, Virginia 22480



LAGOON LOCATION
WITH DIMENSIONS OF CELLS (IN SQUARE FEET)



PICTURES FROM APPLICATION FIELD, AUGUST 2011

Farm Summary Report

Plan: **New Plan** **Fall, 2011 - Winter, 2012**

Farm Name: **Rappahannock Westminster-Canterbury**
Location: Lancaster
Specialist: Scott Rae
N-based Acres: 14.5
P-based Acres: 0.0

Tract Name: **RWC, Inc**
FSA Number: 0
Location: Lancaster

Field Name: **IrrigatedFall2010**
Total Acres: 14.50 Usable Acres: 14.50
FSA Number: 0
Tract: RWC, Inc
Location: Lancaster
Slope Class: A
Hydrologic Group: C

Riparian buffer width: 0 ft
Distance to stream: 0 ft

Conservation Practices:
Pasture (>75% cover)

P-Index Summary
N-based
Phosphorus Limit method: Phosphorus Environmental Threshold (PET) method

Soil Test Results:

DATE	PH	P	K	Lab
Su-2011	6.3	M(27 P lbs/acre)	M(111 K lbs/acre)	Virginia Tech

Field Warnings:

Rappahannock Westminster-Canterbury Narrative

This Nutrient Management Plan is prepared for Rappahannock Westminster-Canterbury, Inc. (RWC) as a component of their Virginia Pollution Abatement Permit renewal (VPA Permit #01401). RWC is a Life Care / Retirement Facility with a Waste Water Treatment Plant. The 2010 Annual Report for the Facility details land application of 11,200 kgals over a period of 49 days throughout the year. Total wastewater treated for 2010 is reported to be 9,561,540 gallons, total net precipitation excess from rainfall into lagoons is calculated at 786,560 gal/ yr.

Apply wastewater during periods of active plant growth. Do not apply wastewater between November 01 through March 01.

Do not apply to point of runoff. Do not apply when natural precipitation and irrigation may saturate soil resulting in limited plant uptake / growth [exceedance of field capacity]. Do not apply to frozen or snow-covered ground. Under no circumstances shall the hydraulic loading rates from liquid waste exceed 0.6 inches per hour (Soils are fine, sandy loam; no slope- 2005, Nutrient Management Standards and Criteria; Table 8.8, p. 116.) Allow sufficient drying time between subsequent irrigation and rainfall so that field capacity is not exceeded. Refer to Special Conditions section for additional limitations.

Soil tests qualify Phosphorus levels as M (medium); the NMP has not incorporated the Phosphorus Index. The plan has been prepared to preemptively prevent phosphorus accumulation in soils. The current vigorous growth of the hay crop represents adequate nutrient supplies. No supplemental commercial nitrogen applications are shown on the job / balance sheet. Long-term management / removal of soil phosphorus may benefit from commercial nitrogen applications potentially increasing plant yield effectively removing any excess P through plant materials. A Spring (~March 01-15) and Summer application (~August 01-15) of 40 pounds nitrogen per acre following crop harvest is acceptable. Harvest of hay crop will enable phosphorus removal from soil system that may otherwise accumulate from grass decomposition.

Immediate modification of this plan is required due to changes in cropping practices and / or increases in manure / effluent application. Soil analysis is recommended every three years or less to determine the soil fertility and pH. Manure / liquid effluent analysis is recommended at least once a year. Annual soil testing is recommended to track soil phosphorus accumulation.

There is no FSA farm tract of field information available; the field was created from wooded property for the land-application of lagoon effluent generated from the facility. The RWC facility is in the process of force-main installation for inclusion in a central sewer system.

Lab ID: 11-35404 2011-08-16 MIDDLESEX / 119

Virginia Cooperative Extension
Soil Test Report

Middlesex County Office
P.O. Box 96
Saluda, VA 23149-8096
804-758-4120

Virginia Tech Soil Testing Laboratory
145 Smyth Hall (0465)
Blacksburg, VA 24061
www.soiltest.vt.edu

SEE ENCLOSED NOTES:
X 1 3

O SAE SCOTT C J
W 2357 BURCHS MILL ROAD O O
N P P
E Y
R
URBANNA, VA 23175

SAMPLE HISTORY

Sample ID	Field	Crop	Acres	Yield Goal	Previous Crop	Manure Applied	Lime Applied	Nutrients Applied			
								N	P2O5	K2O	Previous Crop
ROCK	KEMPSVILLE	Tall Grass - Hay (44)	3 TONS	18+							XXX

LAB TEST RESULTS (see Note 1)

Sample ID	P (Phos)	K (Pot)	Mg (Mag)	Ca (Calc)	Soil pH	Buffer pH	Soluble Salts	Nitrate-N (ppm)
Result	27	111	564	146	6.0	6.2	0.4	24.0	0.3	
Rating	M	M	L+	M-	SUFF	SUFF	SUFF	SUFF	SUFF	

Lab Info	Soil Type	Sand (%)	Silt (%)	Clay (%)	Base Sat (%)	CEC	H (%)	Al (%)
Result	S	6.3	6.29	2.8	29.3	76.7	50.2	21.4	5.1	

FERTILIZER AND LIMESTONE RECOMMENDATIONS

***FAX: 804 693 7037

Crop: Tall Grass - Hay (44)	Lime (T/A)		N	P2O5	K2O
	0		70	50	85

890. Soil Survey map unit information was not provided or did not match our computer database, neither was a field Yield estimate given. As a result only generalized fertilizer recommendations could be made. Field specific and more scientifically- based recommendations can be provided if soil map unit information is included in the future. Contact your extension agent to learn how to obtain available soil survey information for your farm.

990. We are trying to improve our service. PLEASE take a moment to complete our brief, anonymous customer survey at tinyurl.com/soiltestsurvey

827. The N recommendation is for a March application. For additional fall hay production, apply 60-80 lbs N/acre in late August/early September. Do not apply more than 160 lbs N/acres per year.

The analytical methods used are from VCE Publication 452-881, *Laboratory Procedures - Virginia Tech Soil Testing Laboratory, revised 2006.* pH determinations by BR on 08-15-11. Elemental analysis by BR on 08-15-11.

Waste Water Nutrient Analysis
from Annual and Monthly Reporting Sources

ANNUAL REPORT
PART B

3. Analysis of Applied Wastewater (Average for the year)

Parameter	Units	Average
BOD	mg/l	57.3
TSS	mg/l	64.4
Ammonia	mg/l	2.87
TKN	mg/l	6.50
Total Phosphorous	mg/l	3.01
Nitrate-Nitrogen	mg/l	0.320

Report Form E (cont.)
Land Disposal Monitoring Rpt
Weekly/Monthly Effluent Monitoring

Rappahannock Westminster-Canterbury, Inc
VA0061511
Year 2011

Parameter	Ammonia	Nitrate N	TKN	BOD5	TSS	Phosphorous	Potassium
Limits	NL	NL	NL	45.0	60.0	NL	NL
Units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Frequency	1/Month	1/Month	1/Month	1/Month	1/Month	1/Quarter	1/Quarter
Sample	Composite	Composite	Composite	Composite	Composite	Composite	Composite
January	4.5	0.4	6.7	63.0	42.0	1.65	11.72
February	5.4	0.6	8.0	41.0	28.0		
March	6.9	<0.2	13.3	32.0	77.0		
April	2.1	<0.1	9.6	131.0	140.0	1.35	
May	2.1	<0.1	6.6	125.0	48.0		
June	1.5	<0.1	6.0	58.0	45.0		
July	<0.1	<0.1	7.0	16.0	47.0	0.85	18.27
August							
September							
October							
November							
December							

Nutrient Management Plan Balance Sheet
(Fall, 2011-Winter, 2012)
Rappahannock Westminster-Canterbury
Planner: Scott Rae (cert. No. 296)

Tract: RWC, Inc Location: Lancaster
(N = N based, 1P = P based, 1.5P = P based at 1.5 removal, 0P = No P allowed)

Field CFSA No. /Name	Size (ac) Total/ Used	Yr.	Crop	Needs N-P-K (lbs/ac)	Leg /Man Resid	Manure/Biosld Rate & Type (season)	IT (d)	Man/Bios N-P-K (lbs/ac)	Net = Needs - appld N-P-K (lbs/ac)	Sum P rem cred	Commercial N-P-K (lbs/ac)	Notes	
0/IrrigatedFall2010(N)	15/15	2012	Fescue grass hay mt.	90-80-170	0/0	500.k Irriga(Sp) 600.k Irriga(Su) 500.k Irriga(Fa)	N/A N/A N/A	7-30-90 6-25-75 6-25-75	70-0-(70)	N/A		1,2	

Commercial Application Methods:
br - Broadcast ba - Banded sd - Sidedress

Notes:
1 Apply additional nitrogen (liquid / urea) in the Spring to meet crop needs.
2 Application to occur throughout season at alternating times; limit application to half-an-inch per application period. Do not apply to point of ground saturation.

Irrigation / Fertilization Schedule

Irrigate	
Do Not Irrigate	

JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC

Notes:
1 Refer to Special Conditions pages for additional information.
2 Do not apply / irrigate to frozen or snow-covered ground.

Application Summary Report

2012: Fescue grass (hay), maint.

Tract	Field	Acres	Manure Rate and Type (Season)	Broadcast Commercial	Banded Commercial	Topdress Commercial	Lime (tons)
RWC, Inc	IrrigatedFall2010	14.5	500.0k Irrig(Sp) 600.0k Irrig(Su) 500.0k Irrig(Fa)				

Field Productivities for Grass Crops

Tract Name	Tract/ Field	Field Name	Acres	Predominant Soil Series	Grass Hay	Environmental Warnings
RWC, Inc	0/0	IrrigatedFall2010	14.5	Kempsville	II	

Yield Range

Field Productivity Group	Alfalfa Tons/Acre	Grass/Hay Tons/Acre
I	>6	>4.0
II	4-6	3.5-4.0
III	<4	3.0-3.5
IV	NA	<3.0
V	NA	NA

Manure Production Summary

Manure Name: Irrigation Water

Animal Summary
Other: 0

Manure Storage Capacity: 3990. kgals

Manure Analysis:
TKN: .05
P2O5: .05
NH4: .02
K2O: .15

Plant Available Nutrients:
Immediate Incorporation:
.02 lbs N
.05 lbs P2O5
.15 lbs K2O
Surface Applied:
.01 lbs N
.05 lbs P2O5
.15 lbs K2O
Residual N:
yr 1: .00 lbs
yr 2: .00 lbs
yr 3: .00 lbs

Manure Production

Dec-Feb	496
Mar-May	496
Jun-Aug	496
Sep-Nov	496

Total Produced: 1984
Manure Sold/yr: 0
Manure purch./yr: 0

Liquid Manure Production Details

production [kgal/yr] = (# confined)[animals] * (avg wt)[animal-lbs/animal] * (prod factor)[gal/yr/animal-lb] * (0.001)[kgal/gal] + (# confined)[animals] * (waste-water)[gal/day/animal] * (365)[day/yr] * (0.001)[kgal/gal]

Group Name	Production [determined from RWC 2010 Annual Report, Part B, Operating Data]
RWC Waste Water	9,651,540

Net Precipitation Excess

NPE [kgal/yr] = {precip (42.[in/yr]) - evap (39.[in/yr])} * pit/lagoon factor (0.9) * surface area (182879.[sq-ft]) * (1/12)[ft/in] * (7.48)[gal/cu-ft] * (0.001)[kgal/gal] = 786.56[kgal/yr]

Manure Spreading Summary

Season	Manure	Rate/ac	Tract	Field	Acres	Crop	Total in Field	Running Total
2012Sp	Irrigation Water	500.0 kgals	RWC, Inc	IrrigatedFall2010	15	Fescue grass (hay), maint	7250 kgals	7250 kgals
2012Su	Irrigation Water	600.0 kgals	RWC, Inc	IrrigatedFall2010	15	Fescue grass (hay), maint	8700 kgals	8700 kgals
2012Fa	Irrigation Water	500.0 kgals	RWC, Inc	IrrigatedFall2010	15	Fescue grass (hay), maint	7250 kgals	7250 kgals

Nutrient Management Plan Special Conditions for Nutrient Management Plans Developed for Biosolids Applications

July 2008

The following management practices will be utilized for <u>operations using biosolids</u>:

1. Soil samples for biosolid application fields will be analyzed at least once every three (3) years for pH, phosphorus, potassium, calcium, and magnesium in order to maximize the efficient utilization of nutrients. A representative soil sample of each field representing an area up to approximately twenty acres will be comprised of cores randomly sampled throughout the field. Soil sampling core depth will be from 0-4 inches for land that has not been tilled within the past three years, or 0-6 inches for land that has been tilled within the past three years. Soil pH will be maintained at approximate agronomic levels to promote optimum crop growth and nutrient utilization.

2. Application rates for alkaline stabilized biosolids shall be restricted in accordance with a lime requirements test determined by commercial or state soil testing laboratories listed in #3 below. Calcium carbonate equivalent loadings shall not exceed rates exected to attain soil pH values in the plow layer above 6.5 for soils located in the coastal plain and above 6.8 for soils located in other areas of the state.

3. Soil test analysis will be performed by one of the laboratories listed below. Soil phosphorus levels must be determined using the Mehlich I or Mehlich III procedure:
   - A&L Agricultural Laboratories
   - Brookside Laboratories
   - Waters Agricultural Laboratories
   - Spectrum Analytical Laboratories
   - Virginia Tech Soil Testing Lab

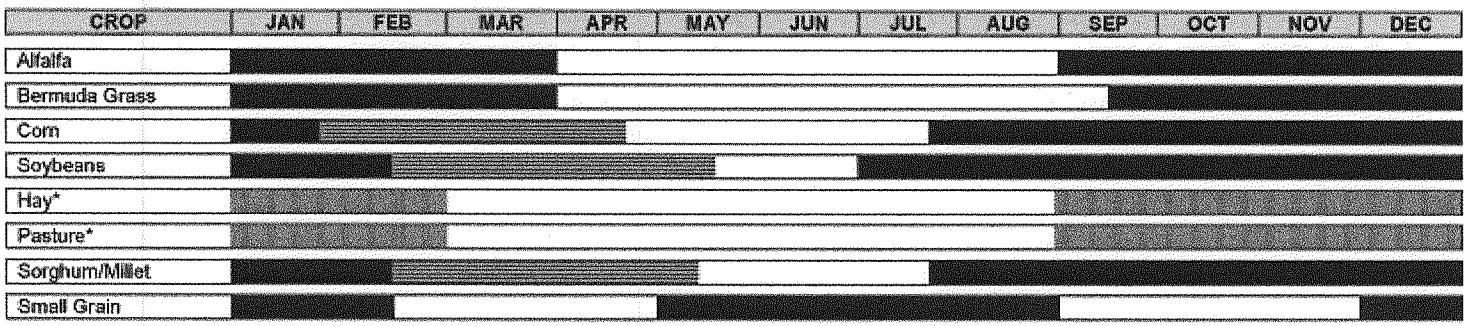
4. The actual biosolids application rates shall be based on he annual average sludge quality. The average sludge quality shall be established from the results of approved analytical testing of composite samples obtained during the most recent 12 months of monitoring. For proposed treatment works rates may be initially based on the biosolids characteristic produced by similar generating facilities. At a minimum, representative biosolids samples will be analyzed at the frequency and for the parameters specified in the VPA or VPDES Permit. These include but are not limited to: total nitrogen or total Kjeldahl nitrogen, ammonia-nitrogen, total phosphorus, total potassium, calcium carbonate equivalency, and and percent solids. Biosolids analysis results will be used to determine actual application rates that do not exceed the nitrogen, phosphorus, and lime application rates specified in the nutrient management plan.

5. All crops will be planted and harvested in a timely manner using commercially acceptable management practices.

6. Make biosolids applications at or near planting or to existing actively growing crops to assure that nutrients are properly utilized. Utilize the spreading schedule contained in the nutrient management plan to determine appropriate biosolids application times and rates. Additional commercial fertilizer applications (especially nitrogen) should be made as a split application separate from the biosolids application, either as a sidedress or topdress application.

7. Biosolids Spreading Schedule.

BIOSOLIDS SPREADING SCHEDULE



Note * Late fall and winter biosolids applications may be made to a trap crop only if applications are in accordance with 4VAC5-15.
Cool season grasses only, Fescue and or Orchardgrass

Spread liquid or dewatered biosolids at the rates and times specified in the nutrient management plan.

Do not spread liquid or dewatered biosolids during these shaded time periods.

Applications during these time periods shall comply with the following:

- Biosolids applications will not be made earlier than 30 days prior to planting on environmentally sensitive sites.
- On fields <u>not listed as environmentally sensitive</u>:
  - Applications of dewatered anaerobically digested or dewatered lime stabilized biosolids will not occur more than 90 days prior to spring planting on fields having (i) slopes less than 7% throughout the application area or (ii) having at least 60% uniform ground cover from crop residue.
  - Liquid biosolids applications will not occur more than 60 days prior to spring planting.

Biosolids applications should be avoided whenever possible during this period (late fall-winter). Fields must have greater than 60% uniform live cover with plant height greater than three (3) inches. Applications made to cool season grass hay and pasture, if applied after 9/1 of any year until 3/1 of the following year, shall not exceed ½ of the total nitrogen rate

As stipulated in 4VAC5-15, applications of sewage sludge to environmentally sensitive sites shall fully comply with these timing requirements immediately. Implementation of these timing requirements on nonenvironmentally sensitive sites shall be required for swage sludge applications on January 1, 2009, and thereafter.

8. For permanent hay or pasture, an adequate stand of hay and/or pasture crop species will be established prior to land application of biosolids. Commercially acceptable stands of the listed species will be maintained and other weeds and grasses controlled. All hay crops will be harvested in a timely and regular manner, removed from fields, and utilized for a suitable purpose.

9. Biosolids will be applied to application sites in a uniform manner.

10. **Do not spread biosolids within the following setback areas or as specified in the permit:**

Minimum distances to Land Application Area			
Adjacent Features	Surface Application (ft)[1]	Incorporation (ft)	Winter (ft) [2]
Occupied Dwellings	200	200	200
Water Supply wells and springs	100	100	100
Property Lines	100	50	100
Perennial streams and other surface waters except intermittent streams	50	35	100
Intermittent streams/drainage ditches	25	25	50
All improved roadways	10	5	10
Rock outcrops	25	25	25
Limestone rock outcrops and sinkholes	25	25	25
Agricultural drainage ditches with slopes equal to or less than 2.0%	10	5	10

Notes:
(1) Not plowed or disked to incorporate within 48 hours
(2) Application occurs on average site slope greater than 7.0% during the time between November 16 of one year and March 15 of the following year
In cases where more than one buffer distance is involved, only the single most restrictive distance shall be used.

11. Field Management Practices and Restrictions:

- Biosolids application shall not be made during times when the seasonal high water table of the soil is within 18 inches of the ground surface.

- Biosolids may only be appliced to snow-covered ground if the snow cover does not exceed one inch and the snow and biosolids are immediately incorporated within 24 hours of application.

- Liquid sludges (above 85.5% moisture content) shall not be applied to frozen ground. Dry or dewatered sludges may be applied to frozen ground only if the field has: slopes not greater than 5.0%, 60% uniform ground cover from crop residue or an existing actively growing crop such as a small grain or fescue with exposed plant height of three inches or more, a minimum of a 200-foot vegetated or adequate crop residue buffer between the application area and all surface water courses, and soils characterized by USDA as "well drained".

- Waste shall not be applied in areas subject to concentrated flow generated by runoff from storm events such that it would discharge into sinkholes in the area.

- To avoid runoff from application fields, do not spread biosolids on soils that are saturated. If overland flow of liquid biosolids which could reach buffer areas is observed, reduce the application rate immediately to prevent runoff.

- The application rate of all application equipment shall be routinely measured as described in an approved sludge management plan and every effort shall be made to ensure uniform application of biosolids within sites in accordance with approved maximum design loading rates.

- Liquid sludges shall not be applied at rates exceeding 14,000 gallons per acre, per application. Sufficient drying times shall be allowed between subsequent applications.

- Application vehicles should be suitable for use on agricultural land. Pasture and hay fields should be grazed or clipped to a height of approximately four and six inches, respectively, prior to biosolids application unless the biosolids can be uniformly applied so as not to mat down the vegetative cover so that the site vegetation can be clipped to a height of aproximately four inches within one week of the biosolids application. If application methods do not result in a uniform distribution of biosolids, additional operational methods shall be employed following application such as dragging with a pasture harrow, followed by clipping if required, to achieve a uniform distribution of the applied biosolids.

12. Nutrient management plans that contain fields in which row crops will be grown will be revised at least once every three (3) years. Nutrient management plans that contain only hay or pasture fields will be revised at least once every five (5) years. Any such plan revisions will be submitted to DCR and the farm operator within two weeks of the revision per 4VACS-15-100 C.

13. Biosolids applications on CRP or CREP lands must be pre-approved by NRCS and an appropriate conservation plan and NMP must be in place prior to application.

14. This nutrient management plan should be amended or modified by the certified planner who developed the initial plan if:

    - additional imported manure, biosolids, or industrial waste that was not identified in the existing plan is applied to fields under the control of the operator;
    - available land area for the utilization of biosolids decreases below the level necessary to utilize biosolids in the plan;
    - cropping systems, rotations, tillage, or fields are changed where phosphorus will be applied at levels greater than crop nutrient needs based on soil analysis; or actual biosolids nutrient applications are significantly more or less than the original planned applications, such that any needed supplemental nutrient applications (from any source) would need to be amended to achieve the appropriate loading rate and yield goals.

15. Any requirements of a permit issued by DEQ, which are more restrictive, supercede these Special Conditions.

Attachment F

Amended Ground Water Monitoring Plan Approval Letter
Ground Water Monitoring Supporting Documentation

VA0091511 R-G-R4

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

PIEDMONT REGIONAL OFFICE
4949-A Cox Road, Glen Allen, Virginia 23060
(804) 527-5020 Fax (804) 527-5106
www.deq.virginia.gov

L. Preston Bryant, Jr.
Secretary of Natural Resources

David K. Paylor
Director

Gerard Seeley, Jr.
Regional Director

December 11, 2008

Stuart A. Bunting, President
Rappahannock Westminster-Canterbury Inc.
132 Lancaster Drive
Irvington VA 22480

RE: VPDES Permit VA0091511 Rappahannock Westminster Canterbury (RWC) - Lancaster County

Dear Mr. Bunting:

The Department of Environmental Quality Piedmont Regional Office is in receipt of the Groundwater Monitoring Plan for this facility as compiled by Bay Design Group, P.C. It was most recently amended December 4, 2008. This plan has been reviewed and is deemed acceptable. It is our understanding that no monitoring wells will be taken off line, so the monitoring described in the permit will continue at MW-1 through MW-6 and shall be extended to proposed wells MW-7 through MW-10.

Please initiate the well installation in accordance with the protocols in this Groundwater Monitoring Plan and notify DEQ – PRO in writing when it is complete, copying our office with the borehole and monitoring well records. We recommend locking well caps, especially for the MW-8 well outside of the treatment area. Your consultant indicated that MW-8 was locked the day it was drilled.

If you have any questions or comments on these requirements, please contact Denise Mosca at (804) 527-5027 or dmmosca@deq.virginia.gov.

Sincerely,

Curtis J. Linderman, P.E.
Water Permits Manager

Cc: Bay Design Group:

Mosca,Denise

From: Katie Perkins [kperkins@baydesigngroup.com]
Sent: Thursday, December 04, 2008 11:37 AM
To: Mosca,Denise
Cc: sbunting@rw-c.org
Subject: Updated Monitoring Well Location for RWC
Attachments: RWC Monitoring Wells 12.4.08.pdf

Hello Denise,

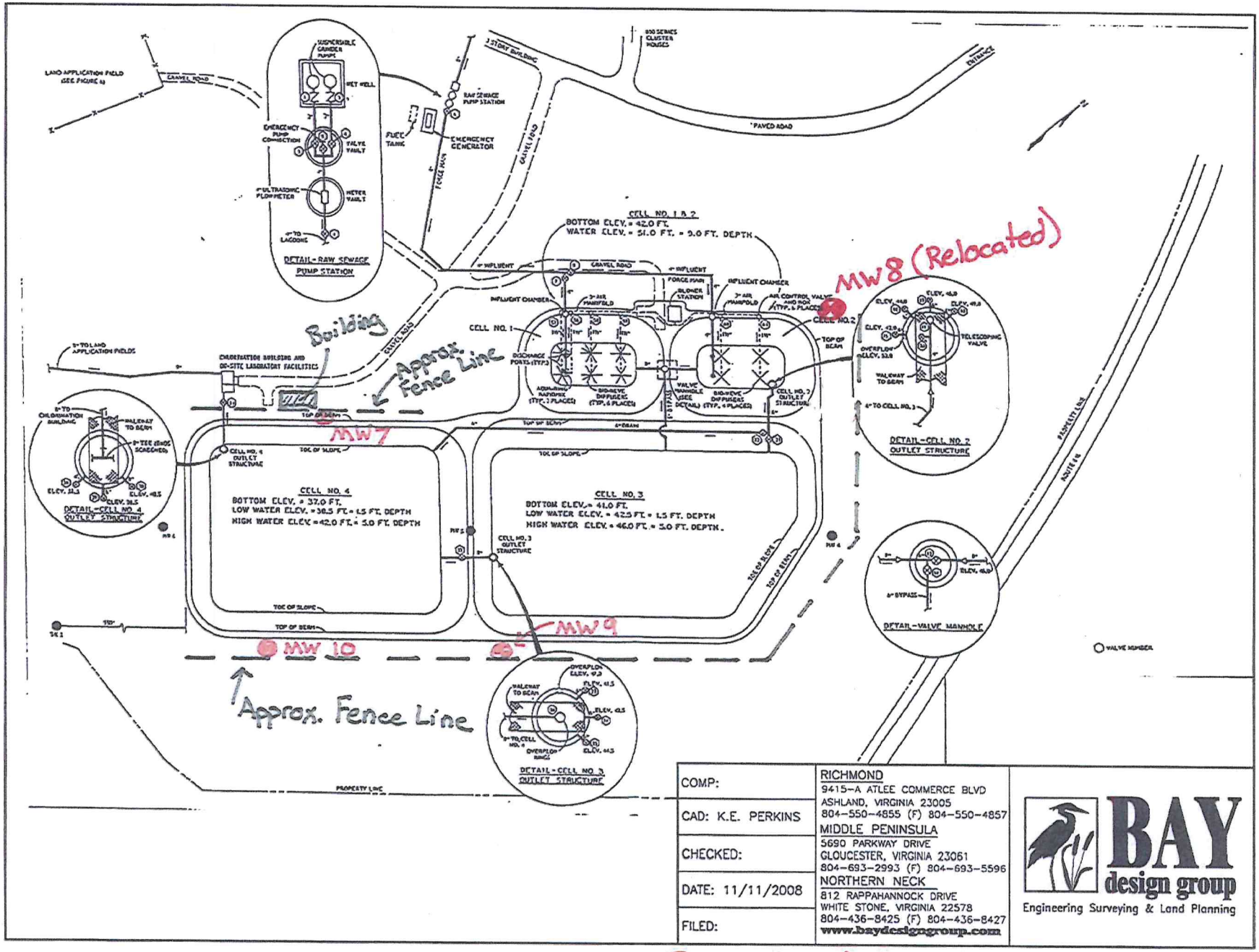
As discussed on the phone, I have revised the location of monitoring well #8 to be a true "up gradient" monitoring well. Please see the attached document. If you have any further questions please call me at 804-693-2993. RWC has contracted with a well driller, and I believe they are ready to begin drilling the wells soon.

Respectfully,

Katie Perkins, E.I.T.
Bay Design Group, P.C.

5690 Parkway Drive
Gloucester, Virginia 23061

Phone: 804.693.2993
Fax: 804.693.5596
Cell: 804.205.2804



COMP:	RICHMOND 9415-A ATLEE COMMERCE BLVD ASHLAND, VIRGINIA 23005 804-550-4855 (F) 804-550-4857
CAD: K.E. PERKINS	MIDDLE PENINSULA 5690 PARKWAY DRIVE GLOUCESTER, VIRGINIA 23061 804-693-2993 (F) 804-693-5596
CHECKED:	NORTHERN NECK 812 RAPPAHANNOCK DRIVE WHITE STONE, VIRGINIA 22578 804-436-8425 (F) 804-436-8427 www.baydesigngroup.com
DATE: 11/11/2008	BAY design group Engineering Surveying & Land Planning
FILED:	

Revised Plan

Revised: 12/4/2008
(Katie Perkins, Bay Design)

ORANDUM

Mixing Zone memo

State Water Control Board
P. O. Box 11143
Richmond, VA. 23230

111 North Hamilton Street

SUBJECT: Rappahannock Westminister-Canterbury Land Application Site

TO: W. S. Bullard

FROM: E. A. Siudyla EAS

DATE: June 14, 1983

COPIES:

This is in regard to ground water monitoring requirements at the subject site.

A survey of existing shallow wells had been completed by Bruce Anderson, Lancaster County Zoning Administrator. The survey showed two shallow wells about 3000 feet upgradient from the site. One well is screened from 27 to 33 feet below the land surface. The other well is screened from 20 to 23 feet below the land surface. Only one additional shallow well is found in the area and it is approximately 500 feet east of the site. It is 22 feet deep.

Based on the well survey, the zone used by shallow wells in the area which must be protected is found at a depth of about 22 feet. In terms of mean sea level this zone is equivalent to 18 to 23 feet above sea level (MSL).

The monitoring wells for the land application project have already been installed. They adequately monitor this shallow aquifer. The elevations for the well screen are 21-26 feet MSL for monitoring well 1, 21.5 to 26.5 MSL for monitoring well 2 and 25-30 MSL for well 3. These wells essentially define a mixing zone depth in the range of 21-30 feet MSL. Monitoring wells 1 and 2 are located about 50 feet downgradient from the land application fields. These wells would serve as a good early warning monitoring system. However, it may be necessary in the future to place additional wells about 200 feet downgradient from the land application fields if contamination is found in the early warning wells. This is based on a mixing zone distance of 200 feet downgradient from the fields, which is equivalent to the downgradient property line.

/sch

SCHNABEL ENGINEERING ASSOCIATES
P. C.
CONSULTING GEOTECHNICAL ENGINEERS

June 8, 1983

JAMES I. SCHNABEL P. E.
RAY E. MARTIN PH. D., P. E.
RAYMOND A. DeSTEPHEN P. E.

ONE WEST CARY STREET
RICHMOND, VIRGINIA 23220
804: 649-7035

Mr. Eugene A. Siudyla
Tidewater Regional Office
State Water Control Board
287 Pembroke Office Park
Suite 310, Pembroke II
Virginia Beach, Virginia 23462

Subject: Contract V83206, Geotechnical Engineering Services, Rappahannock Westminster-Canterbury, Lancaster County, Virginia

Dear Gene:

In response to our telephone conversation of last week, enclosed are pertinent test boring logs (B-29, B-32 through B-38, monitoring wells MW-1, MW-2 and MW-3) and a location plan for the above referenced project. The information included relates to the storage lagoons and land application terraces for this project. Soil stratifications are presented on the test boring logs. The soils of Strata A, B and C represent Columbia Group sediments, while Stratum D represents the Yorktown Formation.

Three monitoring wells were installed around the proposed land application terraces at the locations shown on the Test Boring Location Plan. They were constructed with 1-1/2 inch flush joint PVC pipe and 1-1/2 inch No. 20 slot well screens. The bottom of each well was covered with a PVC cap. Well screens were installed within five feet of the depth groundwater was encountered, at the depths indicated on the boring logs. The annular space was backfilled with clean concrete sand to the top of screen and then a 12 inch^{+} thick bentonite seal was installed. The remaining annular space was backfilled with cuttings from the boring. A four inch protective steel casing with locking cap was installed to a depth of three feet below ground surface and was grouted in place with lean concrete.

Water observation wells consisting of 1-1/4 inch PVC pipe were also installed in Borings B-33 and B-36. The bottom 10 ft of each observation well was hand slotted and the annular space was backfilled with cuttings from the borings. These observation wells were installed for obtaining water level readings only and are not intended for use as sampling wells.

If you should have any further questions concerning the enclosed information, please contact us. All questions as related to design of the land application facility should be directed to the Design Engineer, John McNair and Associates.

Very truly yours,

SCHNABEL ENGINEERING ASSOCIATES, P.C.

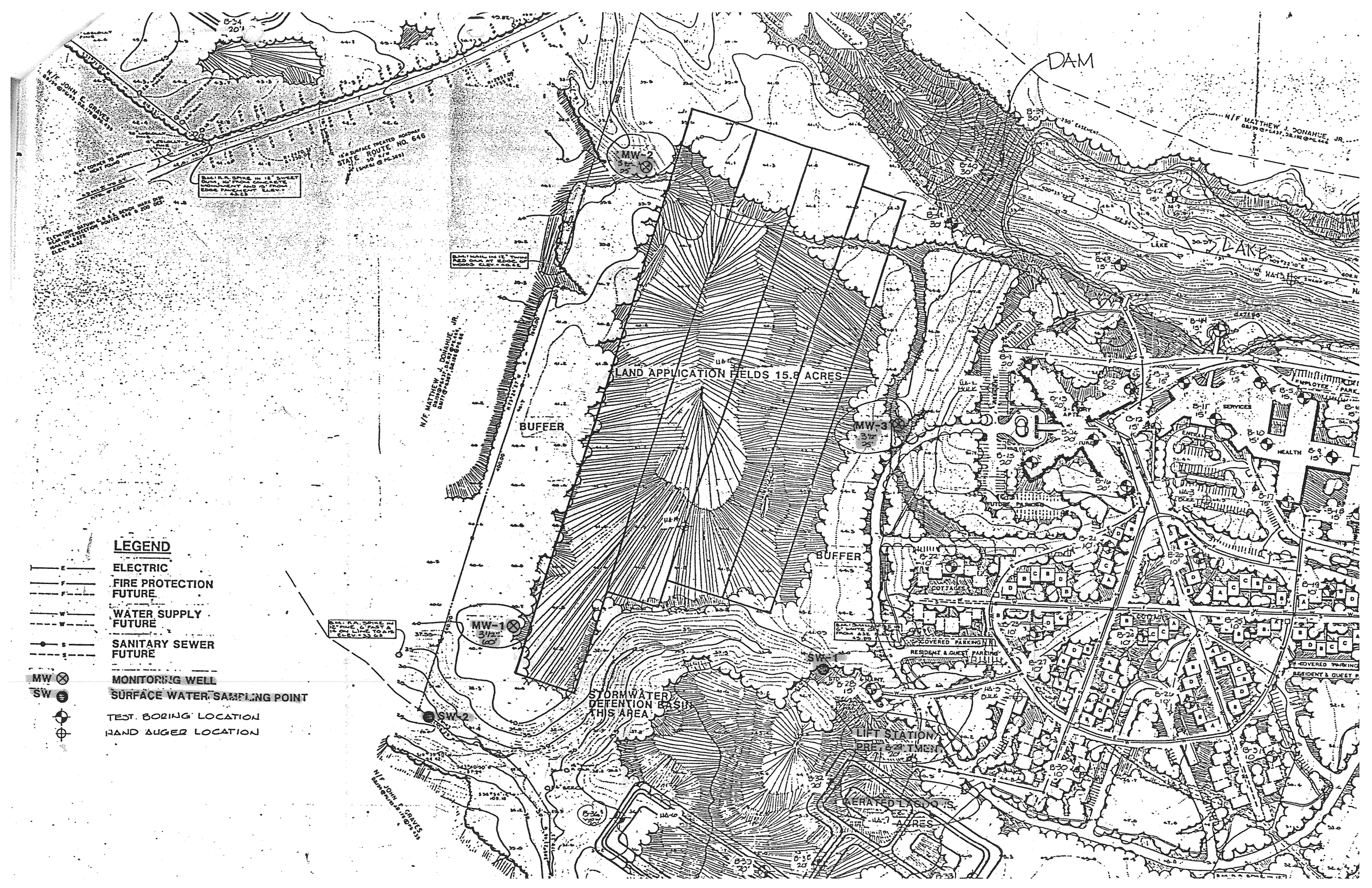
Stephen G. Werner

Stephen G. Werner, P.G.
Senior Engineering Geologist

SGW:maj

Enclosures:
Subsurface Exploration Data
General Notes for Test Boring Logs
Identification of Soil Samples
Test Boring Logs, B-29, B-32 through B-38, MW-1 through MW-3
Test Boring Location Plan, Sheet B-1

c: Mr. Bill Judy, John McNair & Associates
Mr. Charles Holcomb, Jr., Sherertz, Franklin, Crawford & Shaffner


DAM
LAKE
LAKE
LAND APPLICATION FIELDS 15.8 ACRES
BUFFER
BUFFER
MW-1
MW-2
MW-3
SW-1
SW-2
STORMWATER DETENTION BASIN THIS AREA
LIFT STATION
AERATED LAGOONS
4.7 ACRES
N/F MATTHEW J. DONAHUE, JR.
N/F JOHN C. GRAVES
STATE ROUTE NO. 646
LEGEND
ELECTRIC
FIRE PROTECTION FUTURE
WATER SUPPLY FUTURE
SANITARY SEWER FUTURE
MONITORING WELL
SURFACE WATER SAMPLING POINT
TEST BORING LOCATION
HAND AUGER LOCATION

SUBSURFACE EXPLORATION DATA

General Notes for Test Boring Logs

Identification of Soil Samples

Test Boring Logs, B-7, B-29, B-32 through B-43

Monitoring Well Logs, MW-1 through MW-3

Hand Auger Logs, HA-6 through HA-15

Test Boring Location Plan, Sheet B-1

Hollow Stem Auger Borings

All borings were drilled by hollow stem auger equipment. The Standard Penetration Test (SPT) was performed at the depths indicated on the Test Boring Logs. The augers were advanced to the desired depth with plug inserted or were advanced open end and then washed with a fish tail bit. The SPT was performed at the depth shown on the boring logs.

Boring Location and Elevation Survey

Test borings were located in the field by Dawson and Phillips, P.C. Certified Land Surveyors. Test boring elevations were also obtained by the same firm.

GENERAL NOTES FOR TEST BORING LOGS

1. NUMBERS IN "SAMPLE SPOON" COLUMN INDICATE BLOWS REQUIRED TO DRIVE A 2 INCH O.D., 1-3/8 INCH I.D. SAMPLING SPOON 6 INCHES USING A 140 POUND HAMMER FALLING 30 INCHES ACCORDING TO ASTM D-1586.

2. VISUAL CLASSIFICATION OF SOIL IS IN ACCORDANCE WITH TERMINOLOGY SET FORTH IN "IDENTIFICATION OF SOIL." THE UNIFIED SOIL CLASSIFICATION SYMBOLS SHOWN IN PARENTHESES ARE BASED ON VISUAL INSPECTION.

3. ESTIMATED GROUNDWATER LEVELS INDICATED BY ▼; THESE LEVELS ARE ONLY ESTIMATES FROM AVAILABLE DATA AND MAY VARY WITH PRECIPITATION, POROSITY OF THE SOIL, SITE TOPOGRAPHY, ETC.

4. REFUSAL AT THE SURFACE OF ROCK, BOULDER, OR OBSTRUCTION IS DEFINED AS A PENETRATION RESISTANCE OF 100 BLOWS FOR 2 INCHES PENETRATION OR LESS.

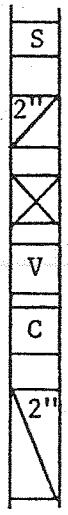
5. THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND AT THE PARTICULAR TIME WHEN DRILLED. SOIL CONDITIONS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS. ALSO, THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE SUBSURFACE SOIL AND GROUNDWATER CONDITIONS AT THESE BORING LOCATIONS.

6. THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES AS DETERMINED FROM THE DRILLING AND SAMPLING OPERATION. SOME VARIATION MAY ALSO BE EXPECTED VERTICALLY BETWEEN SAMPLES TAKEN. THE SOIL PROFILE, WATER LEVEL OBSERVATIONS AND PENETRATION RESISTANCES PRESENTED ON THESE BORING LOGS HAVE BEEN MADE WITH REASONABLE CARE AND ACCURACY AND MUST BE CONSIDERED ONLY AN APPROXIMATE REPRESENTATION OF SUBSURFACE CONDITIONS TO BE ENCOUNTERED AT THE PARTICULAR LOCATION.

7. BORING LOG VERTICAL SCALE: 1/10 INCH = 1 FT.

8. TEST BORINGS DRILLED BY AYERS AND AYERS, INC., RICHMOND, VIRGINIA UNDER INSPECTION OF SCHNABEL ENGINEERING ASSOCIATES.

9. KEY TO SYMBOLS AND ABBREVIATIONS:



STANDARD PENETRATION TEST

2" or 3" UNDISTURBED TUBE SAMPLE (RECOVERY SHOWN IN REMARKS COLUMN)

PRESSUREMETER TEST

VANE SHEAR TEST

STATIC CONE PENETRATION TEST

NX OR 2 INCH O.D. ROCK CORE RUN (RECOVERY SHOWN IN REMARKS COLUMN)

*, NO SAMPLE RECOVERY

do, DITTO

RQD, ROCK QUALITY DESIGNATION

w, NATURAL MOISTURE CONTENT

SCHNABEL ENGINEERING ASSOCIATES

Consulting Geotechnical Engineers

IDENTIFICATION OF SOIL

I. DEFINITION OF SOIL COMPONENTS

Major Material Component	Material Fraction	Sieve Size	Plasticity
GRAVEL, GM, GC, GP, GW	Coarse Fine	3/4 to 3" No. 4 to 3/4	— —
SAND, SM, SC, SP, SW	Coarse Medium Fine	No. 10 to No. 4 No. 40 to No. 10 No. 200 to No. 40	— — —
SILT, ML	—	Passing No. 200	Non-plastic
CLAYEY SILT, ML, MH, CL-ML	—	Passing No. 200	Slight to High
SILTY CLAY, CL	—	Passing No. 200	Medium to High
CLAY, CH	—	Passing No. 200	Very High
ORGANIC SILT, OH, OL	—	Passing No. 200	Slight to High
PEAT, Pt	Partially decomposed fibrous organic matter with or without silt or sand filter		

II. DEFINITION OF COMPONENT PROPERTIES

Component	Proportions of Soil Components	Approximate Percentage by Weight
Major	Noun Form Gravel, Sand, Silt, Clay, etc.	50 or more
Minor	Adjective Form Gravelly, Sandy, Silty, Clayey Silty, Clayey, Silty Clayey	35 to 50
	Some Some Gravel, Some Silt, etc.	12 to 35
	Trace Trace Gravel, trace sand, etc.	1 to 12
	With with rock fragments, with organic matter, etc.	indicates presence only

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS — Unified Soil Classification Symbols are shown in major material component column. Use A Line Chart for laboratory identification.

BOULDERS — Rounded pieces of rock larger than 3 inches

DISINTEGRATED ROCK — Residual soil with a standard penetration resistance of at least 60 blows or more per foot

ROCK FRAGMENTS — Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.

QUARTZ — A hard silica mineral often found in residual soils

IRONITE — Iron oxide deposited within a soil layer forming cemented deposits

CEMENTED SAND — Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other minerals

MICA — A soft silica mineral found in many rocks, and in residual or transported soils derived therefrom

FISSURED CLAYS — Cohesive soils exhibiting a joint structure

ORGANIC MATERIAL (Excluding Peat): Top Soil — Surface soils that support plant life and which contain considerable amounts of organic matter; Decomposed Vegetation — Partially decomposed organic matter which retains its original character; Lignite — Decomposed organic matter with low fixed carbon content frequently exhibiting distinct texture of wood

FILL — Man made deposit containing soil, rock and often foreign matter

PROBABLE FILL — Soils which contain no visually detectable foreign matter but which are suspect with respect to origin

LENSES — 0 to 1/2 inch layer of minor soil component

LAYERS — 1/2 to 12 inch layers of minor soil component

POCKET — Discontinuous pocket of minor soil component

COLOR SHADES — Light or dark to indicate substantial differences in color

MOISTURE CONDITIONS — Wet, moist, or dry to indicate visual appearance of specimen

SCHNABEL ENGINEERING ASSOCIATES CONSULTING ENGINEERS	TEST BORING LOG	BORING NO.: MW-1
PROJECT: RAPPAHANNOCK WESTMINSTER CANTERBURY, LANCASTER, CO.		SHEET NO. 1 OF 1
CLIENT: SHERERTZ, FRANKLIN, CRAWFORD AND SHAFFNER		JOB NO.: V83206
BORING CONTRACTOR: AYERS AND AYERS, INC.	DRILL: CME-45	ELEVATION: 41.0±
WATER LEVEL DATA	DRIVE SAMPLER	CASING SIZE: 3½"
DATE TIME DEPTH CAVED	TYPE S.S.	DATE START: 4-25-83
ENCOUNTERED 4-23 11:30 13.5' -	DIA. 2" O.D.	DATE FINISHED: 4-25-83
AFTER CASING PULLED	WT. 140 #	DRILLER: J. T. STONE
___HR. READING SEE TABLE BELOW	FALL 30"	INSPECTOR: J. DACULAS

STRATUM	DEPTH FT.	ELEV. 41.0±	BLOWS ON SAMPLE SPOON, PER 6"	SYMBOL	IDENTIFICATION	REMARKS
					2"± ROOT MATTER	
			1+1+1	S	FINE TO MEDIUM SILTY SAND WITH ROOT FRAGMENTS, MOIST - TAN (SM - SC)	
			4+4+4	S	do, TRACE CLAY WITH FINE GRAVEL	
			3+4+5	S	do, SOME SILT	
			2+3+3	S	do, TRACE SILT, BROWNISH ORANGE	
		▼	2+3+3	S		
			2+4+4	S	do, WET	Installed well screen between 15' and 20' depth
B			3+3+4	S		
			4+5+4	S	do, TRACE FINE GRAVEL	
			2+3+3	S		
			3+5+7	S	do, SOME SILTY CLAY	
			3+7+7	S	do, FINE TO COARSE, TRACE SILT WITH CLAY LENSES - TAN AND REDDISH BROWN	
	41.5				FINE SANDY CLAYEY SILT, MOIST - DARY GRAY (ML)	
			1+1+2	S		
D			1+3+6	S		
			4+5+9	S		
	60.0		2+3+4	S		

BORING TERMINATED AT 60.0 FT

WATER OBSERVATION WELL DATA

Date	Day	Depth (ft)	Remarks
4-25	0	12.0	Installed to 60 ft
4-26	1	9.6	-
4-28	3	9.4	-

41 15 26

41 20 21

SCHNABEL ENGINEERING ASSOCIATES CONSULTING ENGINEERS	TEST BORING LOG	BORING NO.: MW-2

PROJECT: RAPPAHANNOCK WESTMINSTER CANTERBURY, LANCASTER, CO. | SHEET NO. 1 OF 1
CLIENT: SHERERT2, FRANKLIN, CRAWFORD AND SHAFFNER | JOB NO.: V83206
BORING CONTRACTOR: AYERS AND AYERS, INC. | DRILL: CME-45 | ELEVATION: 36.5±
CASING SIZE: 2½"
DATE START: 4-26-83
DATE FINISHED: 4-26-83
DRILLER: J. T. STONE
INSPECTOR: J. DAOULAS

WATER LEVEL DATA	DATE	TIME	DEPTH	CAVED
ENCOUNTERED	4-26	1:35	9.0'	-
AFTER CASING PULLED	-	-	-	-
___HR. READING	SEE TABLE BELOW			

DRIVE SAMPLER	
TYPE	S.S.
DIA.	2" OD
WT.	140 #
FALL	30"

STRATUM	DEPTH FT.	ELEV. 36.5±	BLOWS ON SAMPLE SPOON, PER 6"	SYMBOL	IDENTIFICATION	REMARKS
					2"± ROOT MATTER	
			3+2+1	S	FINE TO MEDIUM SAND, SOME SILT WITH ROOT FRAGMENTS - MOIST - ORANISH BROWN (SM)	
			3+4+5	S	do, CLAYEY SILTY SAND WITH ORGANIC MATTER - BROWN	
		▼	2+3+4	S	do, SILTY SAND - LIGHT BROWN	
			4+3+2	S	do, ORANGISH BROWN	
B			3+3+3	S	do, SOME SILT - WET	Installed well screen at 10' to 15' depth
			1+2+3	S		
	20.0		3+2+6	S	do, TAN	

BORING TERMINATED AT 20.0 FT

WATER OBSERVATION WELL DATA

Date	Day	Depth (ft)	Remarks
4-26	0	3.9	Installed to 20 ft
4-28	2	4.2	-

36.5
15
21.5

26.5

SCHNABEL ENGINEERING ASSOCIATES CONSULTING ENGINEERS	TEST BORING LOG	BORING NO.: MW-3
PROJECT: RAPPAHANNOCK WESTMINSTER CANTERBURY, LANCASTER, CO.		SHEET NO. 1 OF 1
CLIENT: SHERERTZ, FRANKLIN, CRAWFORD AND SHAFFNER		JOB NO.: V83206
BORING CONTRACTOR: AYERS AND AYERS, INC.	DRILL: CME-45	ELEVATION: 45.0±
WATER LEVEL DATA	DRIVE SAMPLER	CASING SIZE: 3½"
DATE TIME DEPTH CAVED	TYPE S.S.	DATE START: 4-26-83
ENCOUNTERED 4-26 9:25 13.5' -	DIA. 2" O.D.	DATE FINISHED: 4-26-83
AFTER CASING PULLED	WT. 140#	DRILLER: J. T. STONE
___HR. READING SEE TABLE BELOW	FALL 30"	INSPECTOR: J. DAOULAS

STRATUM	DEPTH FT.	ELEV. 45.0±	BLOWS ON SAMPLE SPOON, PER 6"	SYMBOL	IDENTIFICATION	REMARKS
					1"± ROOT MATTER	
			7+5+3	S	FINE TO MEDIUM SILTY SAND WITH ROOT FRAGMENTS, MOIST - TAN (SM)	
			3+1+2	S	do, LIGHT BROWN	
		▼ 40	4+5+4	S	do, WTIH FINE GRAVEL	
			3+5+4	S		
B			3+6+5	S	do, SOME SILT	
		30	4+7+6	S	do, WET	Installed well screen at 15' to 20' depth
			3+3+3	S		
	25.0	20	4+5+5	S	do, MOIST - TAN	
					BORING TERMINATED AT 25.0 FT	

WATER OBSERVATION WELL DATA

Date	Day	Depth (ft)	Remarks
4-26	0	13.5	Installed to 25 ft
4-26	0.5	3.8	-
4-28	2.0	4.0	-

25 -30

Hello USB - File
Rappahannock
Westminister Canterbury

MEMORANDUM

State Water Control Board

2111 North Hamilton Street | P. O. Box 11143 | Richmond, VA 23230

File Copy # 10,942S

STATE WATER CONTROL B
TIDEWATER REGION
NOV 13 1984

SUBJECT: Approval of Final Plans & Specifications for Sanitary Collection and Land Application Facilities

TO: Executive Director

FROM: Assistant Director of Operations, OWRM

DATE: October 29, 1984

COPIES: TRO

Project Name:	Rappahannock Westminister Canterbury
Project Location:	Lancaster County, Virginia
Project Owner:	Rappahannock Westminister Canterbury, Inc.
Project Scope:	Gravity sewers, pump station, force main, and land application sewage treatment facility. (See attached SDH letter).
SDH Approval Date:	September 10, 1984.
SDH Conditions:	1. That an O & M Manual for the pump station and treatment plant will be completed and approved by the Department and the Board before a CTO is issued and these sewerage facilities are put into service. 2. That an adequately sized, on-site generator with automatic transfer switch must be provided to run the pump station and one of the treatment plant blowers during power failures.
Date of Certification By Treatment Works Owner:	N/A
Receiving Facility/ Current Plant Performance:	N/A
Previous Board/Executive Director Action:	No-Discharge Certificate No. MW-ND-020 issued to facility on August 19, 1983.
Staff Comments:	Since the date of the Health Department approval the staff has (1) learned that the storage lagoon and liners have been constructed, and (2) reviewed data which has raised concerns regarding the effect of the seasonal water table on liner integrity. These concerns have been discussed with the project engineers who have agreed to install 3 additional monitoring wells and to maintain a liquid level of 1.5 ft. in the storage lagoons until more data is gathered on the water table in this area. The staff believes that these measures are necessary to insure the integrity of the lagoon liners.

STAFF RECOMMENDATIONS:

In accordance with the approval of the State Department of Health contained in their letter of September 10, 1984, the staff recommends that the Executive Director conditionally approve these plans and specifications subject to the following conditions:

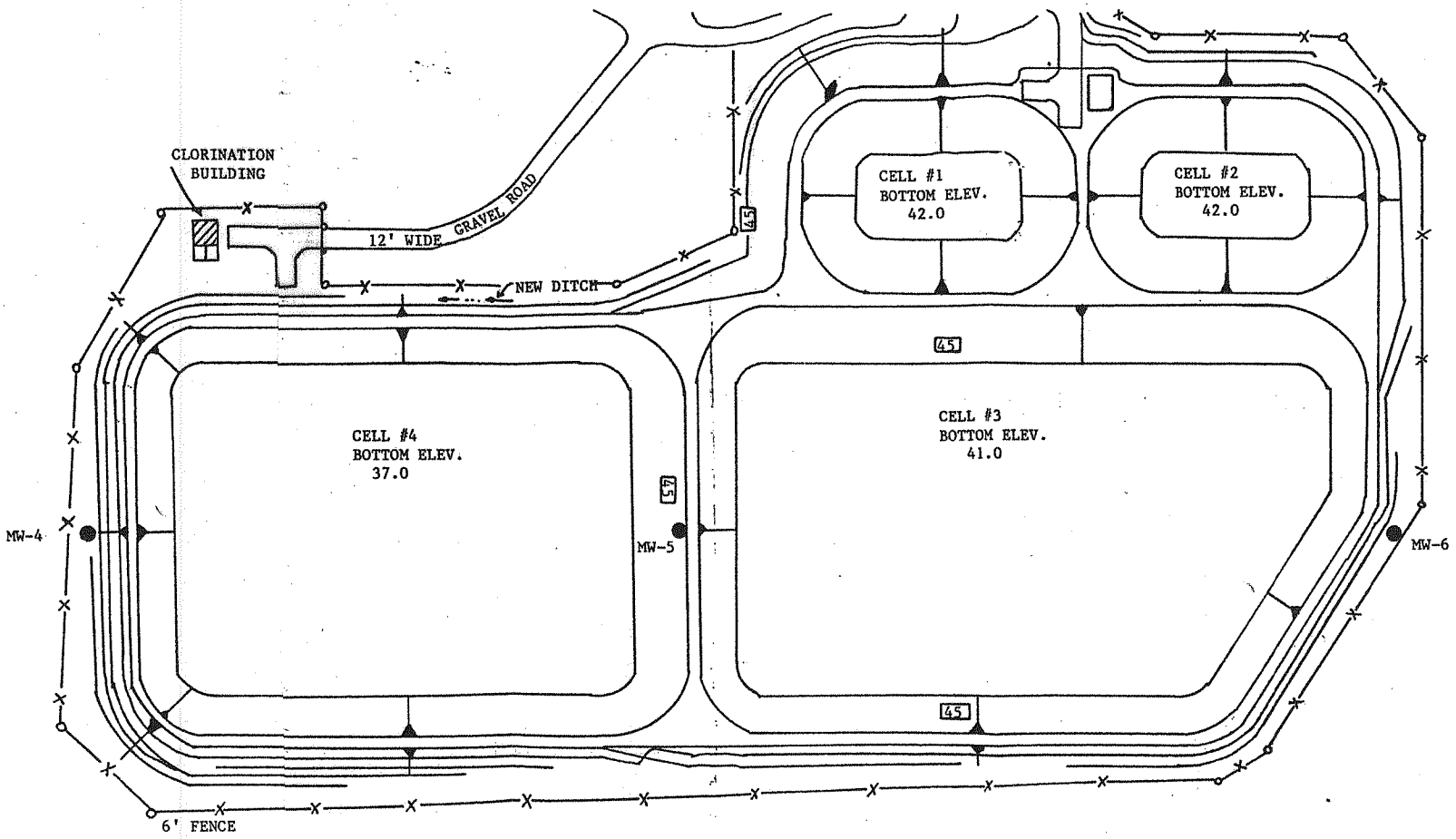
1. Three additional monitoring wells will be immediately installed around the storage lagoons. The wells shall be located on the berm or near its toe at approximately mid-width of the lagoon. One well shall be located between the two lagoons and one at each end of both lagoons. The wells shall be constructed in accordance with the approved well schematics and will measure the seasonal water table elevation beneath the lagoon.

2. Both storage lagoons shall be filled with water to the 1.5 ft. level as soon as possible after completion of liner testing. This liquid level shall be maintained.

HWW:dak

APPROVED BY: _____
Executive Director

_____
Date



FROEHLING & ROBERTSON, INC.
FULL SERVICE LABORATORIES ◎ ENGINEERS & CHEMISTS
"OVER ONE HUNDRED YEARS OF SERVICE"

SCALE: NO SCALE	F&R PROJECT:	DRAWN BY WJC
DATE: 4/1/85	M-55-057	REVISED

MONITORING WELL INSTALLATION, WESTMINSTER - CANTERBURY
W. M. JORDAN

APPROXIMATE BORING LOCATION PLAN

DRAWING NUMBER 2

Form No. 504

ING LOG

FROEHLING & ROBERTSON, INC.
FULL SERVICE LABORATORIES • ENGINEERING/CHEMIC
"ONE HUNDRED YEARS OF SERVICE"
1881

ort No. M-55-057 DATE April 1, 1985

nt: W. M. Jordan

ject: Monitoring Well Installation, Westminster - Canterbury

ing No.: MW-4 | Total Depth: 20.5' | Elevation: | Location: See Drawing No. 2

e of Boring: Hollow Stem Auger | Started: 3/21/85 | Completed: 3/21/85 | Driller: England

levation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	Well Pipe	Back Fill	REMARKS
	0.0	Dark Brown Silty Fine to Medium SAND - Damp	14 9 6	2.0 3.5	Solid	Concrete	GROUNDWATER DATA
	3.0	(SM) (Sedimentary)					Water Stood @ 11.6' Upon Completion wit 19.0' of Auger
		Stiff Brown Fine to Medium Sandy CLAY, with Root Fragments - Damp to Moist (CL) (Sedimentary)					Water Stood @ 10.0' Upon Removal of Auger
	6.0	Very Loose to Medium-Dense Brown, Orange Brown, and Gray Fine to Medium SAND, Little Silt - Wet				8.5 * 9.0	5' of 2" Diameter, 0.010 Slotted PVC Well Screen was Se @ 14.6' with 5' of Pipe Below
		(SP-SM) (Sedimentary)	6 6 11	9.0 10.5	9.6 Screen		*Bentonite
			1 2 2	14.0 15.5	14.6	SAND	
	19.3		4 5 5	19.0 20.5	Solid 19.6		
	20.5	NOTE (1)					NOTE (1) Medium-Dense Gre Gray Fine to Coarse SAND, Little Silt - Wet (SP-SM) (Sedimentary
		Boring Terminated @ 20.5'					

). of blows req'd. for a 140 lb. hammer dropping 30 in. to drive 2 in O.D., 1.375 in. I.D. sampler a total of 18 inches in three 6 increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

Scale 1"=5' unless otherwise n

500

ORING LOG

SINCE 1881

FROEHLING & ROBERTSON, INC.
FULL SERVICE LABORATORIES • ENGINEERING/CHEMIC
"ONE HUNDRED YEARS OF SERVICE"

DATE April 1, 1985

port No. M-55-057

ent: W. M. Jordan

ject: Monitoring Well Installation, Westminster - Canterbury

ing No.: MW-5 | Total Depth: 20.5' | Elevation: | Location: See Drawing No. 2

pe of Boring: Hollow Stem Auger | Started: 3/21/85 | Completed: 3/21/85 | Driller: England

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	Well Pipe	Back Fill	REMARKS
	0.0	Brown Fine to Medium Sandy CLAY, with Mica - Moist					GROUNDWATER DATA
		(CL) (Sedimentary)	9	2.0			Water Stood @ 14.(
	2.2	Medium-Dense Brown Fine to Coarse SAND, Some Silt, with Pockets of Clay - Damp	12				Upon Completion
			9	3.5			with 19.0' of Auge
					Solid	Concrete	Water Stood @ 12.(
		(SM) (Sedimentary)					Upon Removal of
							Auger
						8.5	
	8.0	Medium-Dense Brown Fine to Medium SAND, Little Silt - Damp				*	5' of 2" Diameter
			16	9.0	9.0	9.0	0.010 Slotted PVC
			12				Well Screen was S
			6	10.5			@ 14.0' with 5' o
		(SM) (Sedimentary)					Pipe Below
					Screen		
							*Bentonite
				14.0	14.0		
			2				
			2				
	15.0	Loose Brown and Gray Fine to Coarse SAND, Little Clay, with Gravel - Moist to Wet	3	15.5			
					Solid		
						SAND	
		(SC) (Sedimentary)		19.0	19.0		
	19.2		1				
		NOTE (1)	1				
	20.5		1	20.5			NOTE (1)
		Boring Terminated @ 20.5'					Very Soft Dark
							Gray Organic Fine t
							Medium Sandy CLAY,
							with Lenses of Orga
							Clayey Fine to Medi
							Sand - Wet
							(OL)

RING LOG

FROEH[illegible]G & ROBERTSON, INC.
FULL SERVICE LABORATORIES • ENGINEERING/CHEMICA
"ONE HUNDRED YEARS OF SERVICE"
1881

ort No. M-55-057 DATE April 1, 1985

nt: W. M. Jordan

ect: Monitoring Well Installation, Westminster - Canterbury

ng No.: MW-6 | Total Depth: 20.5' | Elevation: | Location: See Drawing No. 2

e of Boring: Hollow Stem Auger | Started: 3/21/85 | Completed: 3/21/85 | Driller: England

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	Well Pipe	Back Fill	REMARKS
	0.0	Brown Silty Fine to Medium SAND - Damp (SM) (Sedimentary)	3	2.0			GROUNDWATER DATA
	2.4	Medium-Dense Brown and Gray Clayey Fine to Coarse SAND - Damp to Moist (SC) (Sedimentary)	6 9	3.5	Screen	Concrete	Water Stood @ 10.3' Upon Completion wit 19.0' of Auger
							Water Stood @ 8.2' Upon Auger Removal
							5' of 2" Diameter, 0.010 Slotted PVC Well Screen was Set @ 14.6' with 5' of Pipe Below
				8.5		*	
			8	9.0		9.0	
				10.5	9.6		*Bentonite
	12.0	Loose to Medium-Dense Orange Brown Fine to Medium SAND, Some Silt, with Mica - Wet (SM) (Sedimentary)	3	14.0	Screen		
			4 5	15.5	14.6	SAND	
				19.0	Solid		
			8 8 9	20.5	19.6		
	20.5	Boring Terminated @ 20.5'					

No. of blows req'd for a 140 lb hammer dropping 30 in. to drive 2 in O.D., 1 375 in. I.D. sampler a total of 18 inches in three 6 [illegible] of penetration is termed the standard penetration resistance. N.

Scale 1"=5' unless otherwis

Attachment G

Ground Water Monitoring Data Evaluation Memo

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949–A Cox Road **Glen Allen, Virginia 23060** **(804) 527-5020**

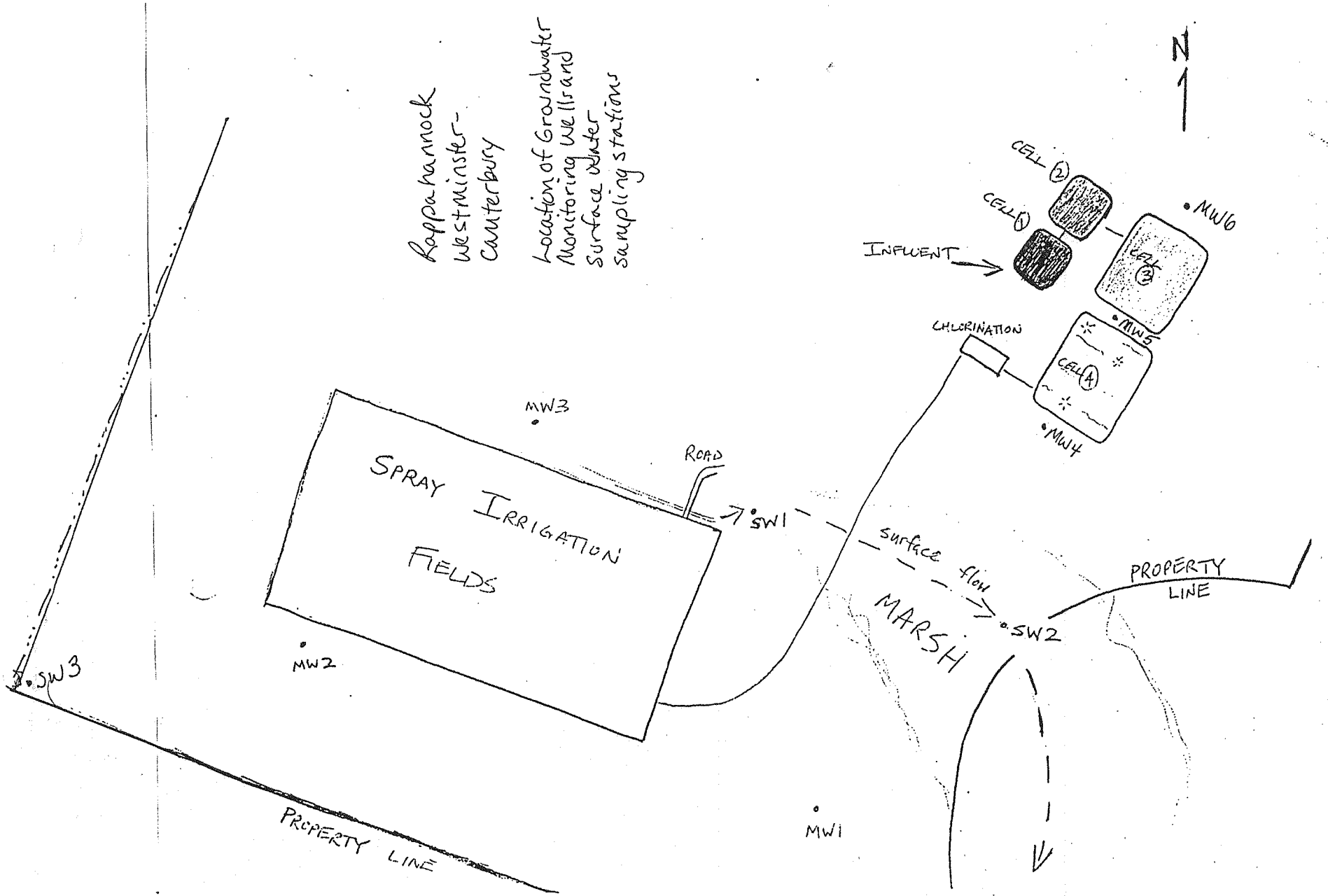
TO:

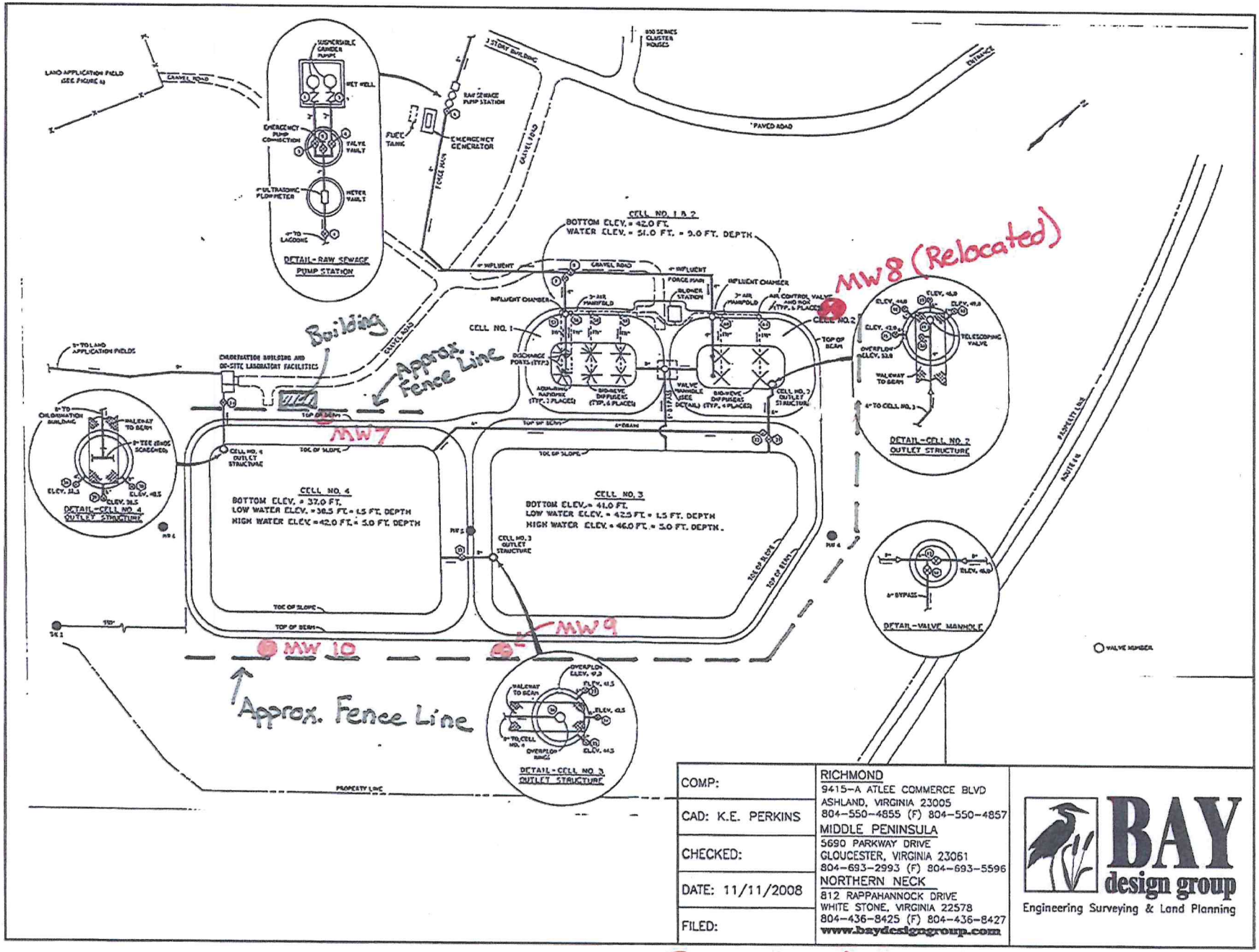
FROM:

DATE:

SUBJECT:

COPIES:


Rappahannock
Westminster-
Canterbury
Location of Groundwater
Monitoring Wells and
Surface Water
sampling stations
N
CELL ②
CELL ①
INFLUENT
MW6
CELL ③
MW5
CHLORINATION
CELL ④
MW4
MW3
ROAD
SPRAY IRRIGATION
FIELDS
SW1
surface flow
MARSH
SW2
PROPERTY
LINE
MW2
SW3
MW1
PROPERTY LINE



COMP:	RICHMOND 9415-A ATLEE COMMERCE BLVD ASHLAND, VIRGINIA 23005 804-550-4855 (F) 804-550-4857
CAD: K.E. PERKINS	MIDDLE PENINSULA 5690 PARKWAY DRIVE GLOUCESTER, VIRGINIA 23061 804-693-2993 (F) 804-693-5596
CHECKED:	NORTHERN NECK 812 RAPPAHANNOCK DRIVE WHITE STONE, VIRGINIA 22578 804-436-8425 (F) 804-436-8427 www.baydesigngroup.com
DATE: 11/11/2008	BAY design group Engineering Surveying & Land Planning
FILED:	

Revised Plan

Revised: 12/4/2008
(Katie Perkins, Bay Design)

Date	Chloride (mg/L)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	[illegible]	[illegible]	[illegible]	5	21	20				
[illegible]	[illegible]	[illegible]	[illegible]	7	21	18				
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[illegible]	[illegible]	[illegible]	[illegible]	8.2	37.3	26.3	43.2	7.9	4.4	4.4
[illegible]	[illegible]	[illegible]	[illegible]	7.9	40.4	21.6	34.9	7.5	5.1	4
[illegible]	[illegible]	[illegible]	[illegible]	6.6	37.5	18.1	33.5	6.7	13.7	4.7
[illegible]	[illegible]	[illegible]	[illegible]	6.9	35.6	12.2	30.2	5.9	4.4	4.3
[illegible]	[illegible]	[illegible]	[illegible]	7.6	39.4	14.9	31.2	6.1	4.3	3.6
[illegible]	[illegible]	[illegible]	[illegible]	8.2	44.7	16.7	36	6.3	4.1	3.9

Date	Conductivity (umohs/cm)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	65	168	32	33	466	176				
[illegible]	62	250	47	51	915	2260				
[illegible]	127	127	48	50	528	226				
[illegible]	75	212	42	70	871	297				
[illegible]	74	269	55	42	755	225				
[illegible]	104	323	54	52	748	247				
[illegible]	74	288	53	43	813	251				
[illegible]	80	301	51	50	826	209				
[illegible]	120	307	66	55	683	209				
[illegible]	76	194	37	33	446	120				
[illegible]	129	296	53	48	681	212				
[illegible]	112	290	59	59	518	196				
[illegible]	49	280	58	50	358	197				
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[illegible]	145	226	45	97	390	160				
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[illegible]	[illegible]	[illegible]	[illegible]	47	330	190	253	dry	88	102
[illegible]	[illegible]	[illegible]	[illegible]	47	310	202	215	53	61	83
[illegible]	[illegible]	[illegible]	[illegible]	40	343	216	234	37	44	51
[illegible]	[illegible]	[illegible]	[illegible]	62	498	320	372	48	55	81
[illegible]	[illegible]	[illegible]	[illegible]	57	460	306	473	4280	102	730
[illegible]	[illegible]	[illegible]	[illegible]	80	415	183	378	40	55	89
[illegible]	[illegible]	[illegible]	[illegible]	467	194	382	372	49	56	67
[illegible]	[illegible]	[illegible]	[illegible]	78	463	282	462	46	60	82

Date	Nitrate Nitrogen (mg/L)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.8	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	0.4	0.8	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.3	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.7	0.3	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.1	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.7	1.9	0.2				
[illegible]	[illegible]	[illegible]	[illegible]	0.4	0.5	0.6				
[illegible]	[illegible]	[illegible]	[illegible]	0.6	0.5	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	1	0.7	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.5	0.3				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.4	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.3	0.4				
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.2	0.2				
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.1	0.3				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	1.2	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.5	1.1	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.1	0.3				
[illegible]	[illegible]	[illegible]	[illegible]	2.2	3.4	2.8				
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.1	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.2	0.3				
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.2	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.2	0.1				
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.4	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.2	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	1.2	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	0.1				
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.3	0.1	0.2	0.7	0.5	0.1
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.2	0.1	0.2	0.7	1.1	0.8
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	0.1	0.1	dry	0.6	5.7
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.1	0.1	0.4	0.6	1.9	0.1
[illegible]	[illegible]	[illegible]	[illegible]	0.4	0.01	0.01	0.1	0.2	1.7	0.1
[illegible]	[illegible]	[illegible]	[illegible]	0.7	0.1	0.1	0.01	0.2	1.7	0.1
[illegible]	[illegible]	[illegible]	[illegible]	0.6	0.1	0.1	0.01	0.1	0.5	0.01
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	0.1	0.2	0.3	1.8	0.1
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	0.1	0.1	0.5	1.8	0.1
[illegible]	[illegible]	[illegible]	[illegible]	0.3	0.1	0.1	0.1	0.6	1.9	0.1

Date	pH (standard units)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	[illegible]	[illegible]	[illegible]	5.6	6.3	5.6				
[illegible]	[illegible]	[illegible]	[illegible]	4.6	6	6				
[illegible]	[illegible]	[illegible]	[illegible]	5.3	6.2	6.1				
[illegible]	[illegible]	[illegible]	[illegible]	6.2	6.1	6.2				
[illegible]	[illegible]	[illegible]	[illegible]	4.7	7.4	6.4				
[illegible]	[illegible]	[illegible]	[illegible]	4.5	6.4	5.4				
[illegible]	[illegible]	[illegible]	[illegible]	4.9	6.6	5.8				
[illegible]	[illegible]	[illegible]	[illegible]	5.2	6	5.5				
[illegible]	[illegible]	[illegible]	[illegible]	5	6.2	5.6				
[illegible]	[illegible]	[illegible]	[illegible]	5.2	6.8	6.8				
[illegible]	[illegible]	[illegible]	[illegible]	4.2	5.5	5.2				
[illegible]	[illegible]	[illegible]	[illegible]	5.2	5.9	6.1				
[illegible]	[illegible]	[illegible]	[illegible]	5	6.5	6				
[illegible]	[illegible]	[illegible]	[illegible]	5.5	6	6				
[illegible]	[illegible]	[illegible]	[illegible]	5.4	6.2	5.9				
[illegible]	[illegible]	[illegible]	[illegible]	5.8	6.3	6.4				
[illegible]	[illegible]	[illegible]	[illegible]	5.8	6.3	5.8				
[illegible]	[illegible]	[illegible]	[illegible]	5.9	6.5	6				
[illegible]	[illegible]	[illegible]	[illegible]	6	5	5				
[illegible]	[illegible]	[illegible]	[illegible]	6	5.5	5.5				
[illegible]	[illegible]	[illegible]	[illegible]	4.6	5.9	5.9				
[illegible]	[illegible]	[illegible]	[illegible]	3.9	4.8	5.2				
[illegible]	[illegible]	[illegible]	[illegible]	5	5.7	6.2				
[illegible]	[illegible]	[illegible]	[illegible]	5.6	6	6.6				
[illegible]	[illegible]	[illegible]	[illegible]	4.8	5.5	6.2				
[illegible]	[illegible]	[illegible]	[illegible]	5.4	6.1	6.9				
[illegible]	[illegible]	[illegible]	[illegible]	5.5	5.6	6				
[illegible]	[illegible]	[illegible]	[illegible]	4.9	6.08	6.35				
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]	4.83	6.07	5.76				
[illegible]	[illegible]	[illegible]	[illegible]	5.5	6.07	6.63				
[illegible]	[illegible]	[illegible]	[illegible]	5	5.94	6.1				
[illegible]	[illegible]	[illegible]	[illegible]	5.47	5.89	5.98				
[illegible]	[illegible]	[illegible]	[illegible]	5.09	5.13	6.13	5.38	4.94	5.04	5.37
[illegible]	[illegible]	[illegible]	[illegible]	4.9	5.92	6.1	5.38	4.94	5.01	5.37
[illegible]	[illegible]	[illegible]	[illegible]	4.84	5.6	6.03	5.24	dry	4.88	5.5
[illegible]	[illegible]	[illegible]	[illegible]	4.7	5.57	5.73	5.15	4.76	4.77	4.9
[illegible]	[illegible]	[illegible]	[illegible]	4.74	5.42	5.94	5.3	4.75	4.88	5.04
[illegible]							5.32	4.91	4.89	5.1
[illegible]							5.34	4.82	4.84	5.07
[illegible]							5.77	4.72	4.95	4.76
[illegible]	[illegible]	[illegible]	[illegible]	4.91	5.39	5.93	5.66	4.87	4.87	5.01

Date	Total Organic Carbon (mg/L)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]	4.7	61.38	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	4.93	101.4	[illegible]				
[illegible]				5.19	115.42	[illegible]				
[illegible]				4.33	83.78	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	2.2	4.6	[illegible]	[illegible]	[illegible]	[illegible]	10.5
[illegible]				2.9	2.7	[illegible]	[illegible]	[illegible]	[illegible]	10.2
[illegible]				1.4	3.6	[illegible]	[illegible]	[illegible]	[illegible]	9.9
[illegible]				1.3	2.1	[illegible]	[illegible]	[illegible]	[illegible]	6.2
[illegible]	[illegible]	[illegible]	[illegible]	1.5	2.7	[illegible]	[illegible]	[illegible]	[illegible]	11.3
[illegible]				1.8	4	[illegible]	[illegible]	[illegible]	[illegible]	9.9
[illegible]				3.8	5	[illegible]	[illegible]	[illegible]	[illegible]	13.3
[illegible]				5.6	2.9	[illegible]	[illegible]	[illegible]	[illegible]	13.6
[illegible]	[illegible]	[illegible]	[illegible]	1.7	3.3	[illegible]	[illegible]	[illegible]	[illegible]	4.1
6/2/2011				2.6	2.9	2.4	2.6	1.5	2.9	2.4

Date	Total Phosphorus (mg/L)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	[illegible]	[illegible]	[illegible]	0.226	0.22	0.47				
[illegible]	[illegible]	[illegible]	[illegible]	0.6	0.28	0.37				
[illegible]	[illegible]	[illegible]	[illegible]	0.13	0.37	0.23				
[illegible]	[illegible]	[illegible]	[illegible]	0.11	0.29	0.24				
[illegible]	[illegible]	[illegible]	[illegible]	0.16	0.35	0.19				
[illegible]	[illegible]	[illegible]	[illegible]	0.18	0.28	0.24				
[illegible]	[illegible]	[illegible]	[illegible]	0.09	0.23	0.2				
[illegible]	[illegible]	[illegible]	[illegible]	0.16	0.2	0.19				
[illegible]	[illegible]	[illegible]	[illegible]	0.18	0.18	0.14				
[illegible]	[illegible]	[illegible]	[illegible]	0.12	0.19	0.16				
[illegible]	[illegible]	[illegible]	[illegible]	0.19	0.09	0.9				
[illegible]	[illegible]	[illegible]	[illegible]	0.17	0.07	1.04				
[illegible]	[illegible]	[illegible]	[illegible]	0.23	0.23	0.55				
[illegible]	[illegible]	[illegible]	[illegible]	0.13	0.06	0.3				
[illegible]	[illegible]	[illegible]	[illegible]	0.05	0.04	1.21				
[illegible]	[illegible]	[illegible]	[illegible]	0.06	0.04	0.48				
[illegible]	[illegible]	[illegible]	[illegible]	0.14	0.13	0.04				
[illegible]	[illegible]	[illegible]	[illegible]	0.36	0.09	0.76				
[illegible]	[illegible]	[illegible]	[illegible]	0.65	0.48	11.92				
[illegible]	[illegible]	[illegible]	[illegible]	0.38	0.34	18.12				
[illegible]	[illegible]	[illegible]	[illegible]	0.52	0.15	1.41				
[illegible]	[illegible]	[illegible]	[illegible]	0.71	0.05	0.87				
[illegible]	[illegible]	[illegible]	[illegible]	0.63	0.35	13.02				
[illegible]	[illegible]	[illegible]	[illegible]	0.85	0.35	9.82				
[illegible]	[illegible]	[illegible]	[illegible]	1.49	0.67	2.45				
[illegible]	[illegible]	[illegible]	[illegible]	2.57	0.29	2.55				
[illegible]	[illegible]	[illegible]	[illegible]	1.18	0.65	10.93				
[illegible]	[illegible]	[illegible]	[illegible]	0.97	0.14	9.05				
[illegible]	[illegible]	[illegible]	[illegible]	0.75	0.75	1.57				
[illegible]	[illegible]	[illegible]	[illegible]	0.52	0.01	6.49				
[illegible]	[illegible]	[illegible]	[illegible]	0.32	4.84	3.94				
[illegible]	[illegible]	[illegible]	[illegible]	0.18	1.48	1.21				
[illegible]	[illegible]	[illegible]	[illegible]	0.19	0.07	2.49				
[illegible]	[illegible]	[illegible]	[illegible]	0.08	0.13	7.58				
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]	0.2	0.13	5..16				
[illegible]	[illegible]	[illegible]	[illegible]	0.14	0.11	5.81				
[illegible]	[illegible]	[illegible]	[illegible]	0.13	0.6	8.09	16.11	9.4	16.83	0.35
[illegible]				0.78	2.87	1.5	0.33	0.29	2.23	0.5
[illegible]	[illegible]	[illegible]	[illegible]	0.07	0.1	1.23	0.25	0.31	0.21	0.11
[illegible]	[illegible]	[illegible]	[illegible]	0.1	0.1	4.24	0.14	1.49	1.49	0.1

Date	Total Recoverable Sodium (mg/L)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[illegible]	[illegible]	[illegible]	[illegible]	5.22	146.22	5.38				
[illegible]	[illegible]	[illegible]	[illegible]	5.16	193.78	15.26				
[illegible]	[illegible]	[illegible]	[illegible]	6.72	14.42	14.42				
[illegible]	[illegible]	[illegible]	[illegible]	5.99	187.68	25.46				
[illegible]	[illegible]	[illegible]	[illegible]	4.55	156.98	14.15				
[illegible]	[illegible]	[illegible]	[illegible]	9.48	160.55	14.26				
[illegible]	[illegible]	[illegible]	[illegible]	4.59	157.16	19.46				
[illegible]	[illegible]	[illegible]	[illegible]	4.88	164.34	13.45				
[illegible]	[illegible]	[illegible]	[illegible]	30.3	150.32	31.55				
[illegible]	[illegible]	[illegible]	[illegible]	5.23	156.02	8.36				
[illegible]	[illegible]	[illegible]	[illegible]	4.92	146.34	12.88				
[illegible]	[illegible]	[illegible]	[illegible]	6.08	107.63	13.18				
[illegible]	[illegible]	[illegible]	[illegible]	5.06	60.86	1.2				
[illegible]	[illegible]	[illegible]	[illegible]	5.08	50.68	7.61				
[illegible]	[illegible]	[illegible]	[illegible]	0.22	55.96	7.76				
[illegible]	[illegible]	[illegible]	[illegible]	4.73	55.65	11				
[illegible]	[illegible]	[illegible]	[illegible]	7.53	21.44	16.05				
[illegible]	[illegible]	[illegible]	[illegible]	6.27	139.12	14.61				
[illegible]	[illegible]	[illegible]	[illegible]	3.56	172.12	17.37				
[illegible]	[illegible]	[illegible]	[illegible]	5.68	184.95	22.44				
[illegible]	[illegible]	[illegible]	[illegible]	11.3	133.5	29.3				
[illegible]	[illegible]	[illegible]	[illegible]	6.25	15.46	13.4				
[illegible]	[illegible]	[illegible]	[illegible]	12.93	9.79	16.73				
[illegible]	[illegible]	[illegible]	[illegible]	4.03	25.38	7.58				
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]	4.7	61.38	28.4				
[illegible]	[illegible]	[illegible]	[illegible]	4.93	101.4	12.03				
[illegible]	[illegible]	[illegible]	[illegible]	5.19	115.42	17.53				
[illegible]	[illegible]	[illegible]	[illegible]	4.33	83.78	17.75				
[illegible]	[illegible]	[illegible]	[illegible]	4.87	52.57	6.3	52.93	12.84	17.54	12.3
[illegible]	[illegible]	[illegible]	[illegible]	5.53	110.3	13.09	52.31	6.85	9.11	9.5
[illegible]	[illegible]	[illegible]	[illegible]	4.95	56.79	13.73	57.48	dry	14.58	10.75
[illegible]	[illegible]	[illegible]	[illegible]	4.32	56.74	20.91	45.37	6.44	2.76	10.12
[illegible]	[illegible]	[illegible]	[illegible]	5.04	83.49	20.3	65.24	5.71	6.45	9.14
[illegible]	[illegible]	[illegible]	[illegible]	5.06	88.63	14.59	73.3	4.96	7.39	7.5
[illegible]	[illegible]	[illegible]	[illegible]	5.03	45.29	19.24	22707	4.53	10.24	6.83
[illegible]	[illegible]	[illegible]	[illegible]	5.55	86.73	8.35	92.52	4.63	6.85	11.14
[illegible]	[illegible]	[illegible]	[illegible]	4.58	95.33	11.54	95.61	4.94	4.89	8.41
[illegible]	[illegible]	[illegible]	[illegible]	5.18	104	11.42	120	5.29	7.15	8.62

Date	Total Dissolved Solids (mg/L)									
	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8	MW 9	MW 10
[redacted]	[redacted]	[redacted]	[redacted]							
[redacted]	[redacted]	[redacted]	[redacted]							
[redacted]	[redacted]	[redacted]	[redacted]							

Groundwater Data and Analysis Summary fo Chloride

Fa lity :	Rappahann ck WTF		
[illegible]	VA0091511	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]	MW		
[illegible]	MW		
ell	MW		
ell			
ell			
[illegible]			

	o ness %	Significant difference from Upgradient Well?	Trend An l si	
			[illegible]	Sl e
MW	se T es	[illegible]	0. 975	0. 0 6
MW	Use	[illegible]	0. 191	0. 016

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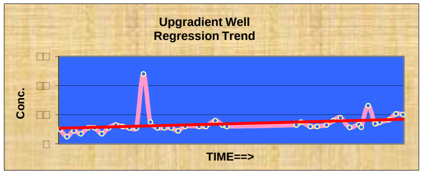
se

[illegible]	[illegible]	[illegible]	[illegible]
2 8 19 9	0	9	4
5 4 1 99	5	[illegible]	4
8 2 1 99	9	9	3
1 1 19 9	7	[illegible]	4
2 9 2 00	1	[illegible]	4
5 0 20 0	1	[illegible]	4
8 1 2 00	7	[illegible]	4
[illegible]	[illegible]	[illegible]	[illegible]
2 1 2 01	3	[illegible]	5
5 3 2 01	2	[illegible]	5
8 2 2 01	1	[illegible]	5
1 2 20 1	1	[illegible]	1
2 4 2 02	8	[illegible]	1
5 6 2 02	5	[illegible]	8
8 5 2 02	1	[illegible]	5
1 4 20 2	1	[illegible]	5
2 5 2 03	1	[illegible]	5
5 6 2 0	[illegible]	[illegible]	5
[illegible]	[illegible]	[illegible]	[illegible]
2 5 2004	12	9	66
5 4 2004	12	9	52
9 9 2004	16	2	67
1 / 0 4	13	0	68
2 9 2005	12	2	[illegible]
8 7 2007	13	3	71
1 / 0 7	15	3	62
2 5 2008	12	3	61
5 6 2008	12	7	[illegible]
9 9 2 0	1	[illegible]	5
1 / 0 8	16	9	49
3 5 2009	18	3	67
7 7 2009	.	39.	6 .
[illegible]	[illegible]	[illegible]	[illegible]
1 / 0 9	.	34.	55
3 3 2010	.	40.	5 .
6 3 2010	.	25.	5 .
8 4 2010	.	19.	4 .
1 / / 0 0	.	22.	2 .
3 2 2011	.	3 1	4 .
6 2 2 1	.	5 .	[illegible]
?	[illegible]	1 6	6 81
?	3 70	2 1	9 82
Is 3 ? ?	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

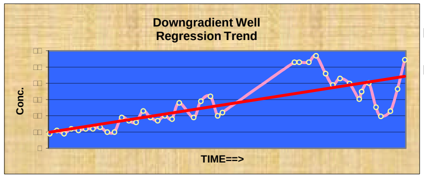
MW 3 (Upgradient Well)



-Sq = 0 0 82

0 0 14

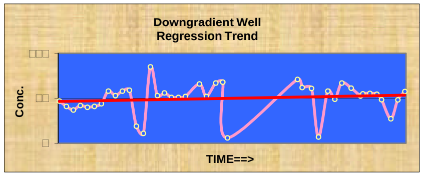
MW 1



-Sq = 0 5 75

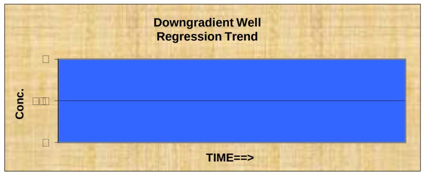
0 0 76

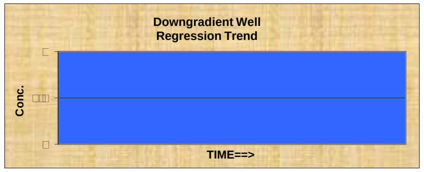
MW 2

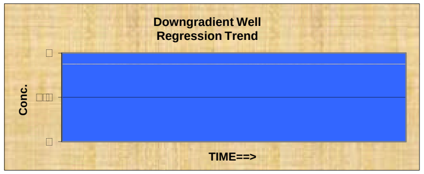


-Sq = 0 0 91

0 0 16







Groundwater Data and Analysis Summary for Chloride

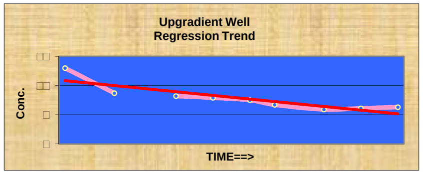
Fa lity :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW	
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Tren An l si	
			.	Sl e
MW	Use	[illegible]	0. 576	006
[illegible]	Use	[illegible]	0. 994	0. 063
[illegible]	Use	[illegible]	0. 617	. 080

Pl c bov
se

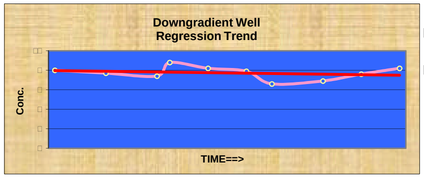
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 5 2 09	3	8	3	1
7 7 2 09	.	.	4	17
1 3 20 9		.	3	17
1 2 20 9	.	.	3	23
3 3 2 10	.	.	3	26
6 3 2 10	.	.	4	21
8 4 2 10	.	.	3	18
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	.	.	3	14
6 2 2 11	.	.	4	16
?	[illegible]	0 6	3	[illegible]
?	[illegible]	7 7	8 21	9 00
Is 3 ? ?	ES	Y S	YE	ES

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he



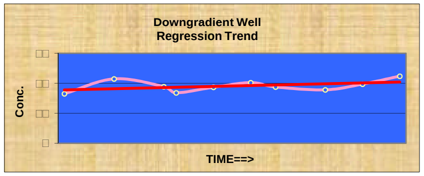
-Sq = 0 7 31

-0 7



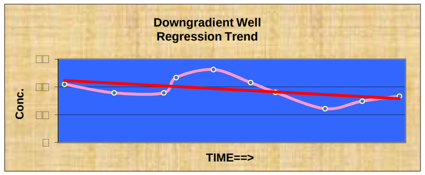
-Sq = 0 0 76

-0 0



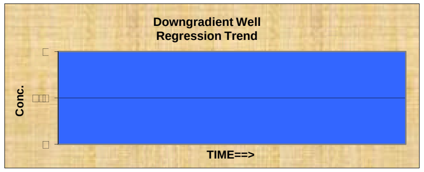
-Sq = 0 1 94

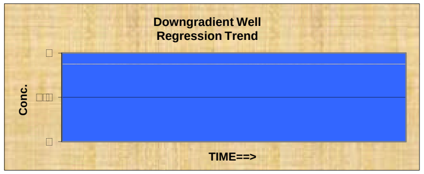
0 0 63



-Sq 0 2 1

-0 8





Groundwater Data and Analysis Summary fo Chloride

Fa lity :	Rappahann ck WTF		
[illegible]	VA0091511	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW 0	
ell			
[illegible]			

	o ness %	Significant difference from Upgradient Well?	Trend An l si	
			.	Sl e
MW	Use	[illegible]	0. 554	049
MW	T es	[illegible]	0. 965	. 196
[illegible]	Use	[illegible]	0. 778	. 044

Pl c bov

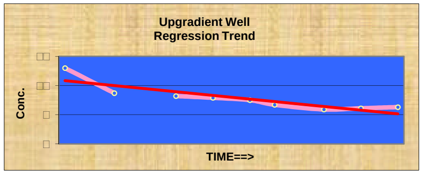
se

[illegible]	[illegible]	[illegible]	[illegible]	MW
3 5 2 09	3	[illegible]	2	8
7 7 2 09	.	33	1	.
1 3 20 9		43	1	.
1 2 20 9	.	25	6 1	.
3 3 2 10	.	43	4 4	.
6 3 2 10	.	34	5 1	4
8 4 2 10	.	33	1	.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	.	31	4 3	.
6 2 2 11	.	[illegible]	4 1	.

?	[illegible]	5 4	7	[illegible]
?	[illegible]	3 1	9	[illegible]
Is 3 ? ?	ES	Y S	**NO**	ES

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

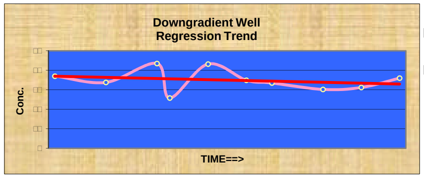
MW 8 (Upgradient Well)



-Sq = 0 7 31

-0 7

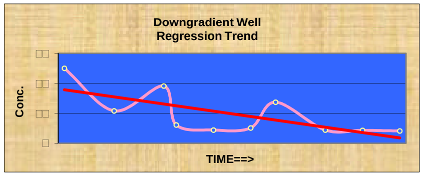
MW 7



-Sq = 0 0 54

-0 4

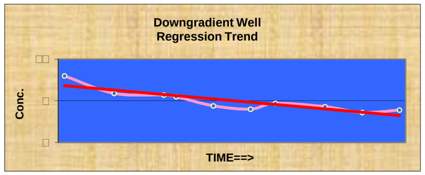
MW 9



-Sq = 0 4 65

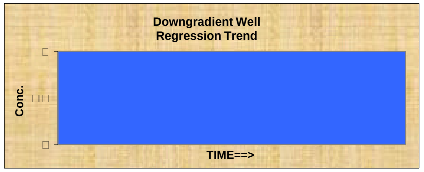
-0 9

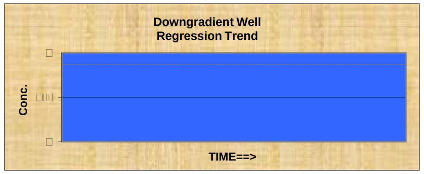
MW 10



-Sq 0 7 7

-0 4

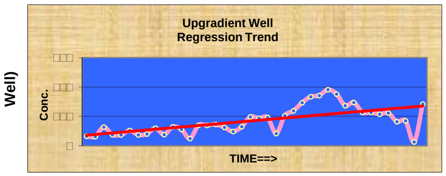




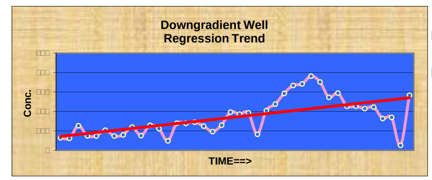
		Significant difference from Upgradient Well?	

	NO	NO	

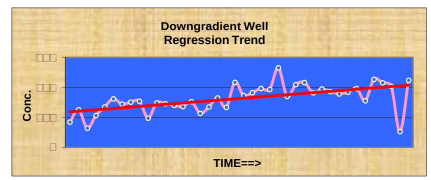
MW 3 (Upgradient Well)

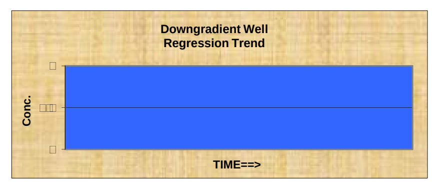


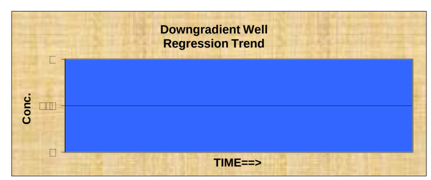
MW 1

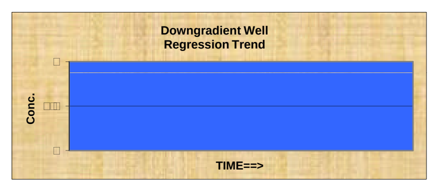


MW 2









Groundwater Data and Analysis Summary for Conductivity

[illegible]: [illegible]

Fa lity [illegible]:	Rappahann ck [illegible] WTF		
[illegible]	VA0091511	Da e:	1/ 7 2 12
[illegible]	[illegible]	[illegible]	umoh /cm
[illegible]		MW	
[illegible]		MW	
[illegible] ell [illegible]		MW	
[illegible] ell [illegible]		MW	
[illegible] ell [illegible]			
[illegible]			

	[illegible] o ness [illegible] % [illegible]	Significant difference from Upgradient Well?	Trend An l si	
			[illegible].	Sl e
MW	[illegible] Use [illegible]	[illegible]	0. 497	0. 4 1
MW	[illegible] Use [illegible]	[illegible]	0. 112	0. 389
MW	[illegible] Use [illegible]	[illegible]	0. 769	0. 604

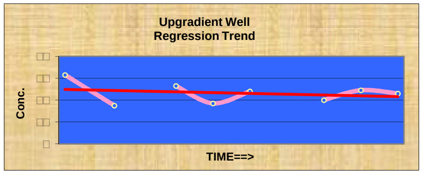
Pl c [illegible] bov [illegible]
[illegible] se [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 5 2 09	3	[illegible]	3 1	20
7 7 2 09	5	[illegible]	4 6	19
1 3 20 9		[illegible]	3 0	19
1 2 20 9	3	[illegible]	3 0	20
3 3 2 10	7	[illegible]	3 3	21
6 3 2 10	8	[illegible]	4 8	32
8 4 2 10		[illegible]	4 0	30
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	9	67	1 4	38
6 2 2 11	6	[illegible]	4 3	28

[illegible]?	[illegible]	31. 4	7 41	9 33
[illegible]?	6 38	9 0	37 . 0	2 . 0
Is [illegible] 3 [illegible]? ?	ES	**NO**	YE	ES

Note: he ompar on of t e ean [illegible] imes he andard [illegible] ay [illegible] det [illegible] ine [illegible] is a t istica y ignif cant change in he [illegible] of [illegible] et [illegible] ny of [illegible] bove [illegible] NO , [illegible] ay [illegible] udden inc ase [illegible] oncentrat n [illegible] t e arame er. [illegible] hould [illegible] nd ot [illegible] bas [illegible] any [illegible] dec ions regarding he [illegible]

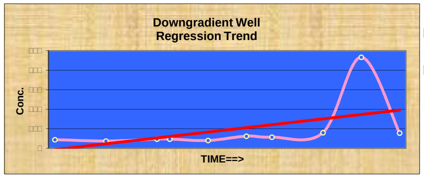
MW 8 (Upgradient Well)



-Sq = 0 0 51

[illegible] -0 8

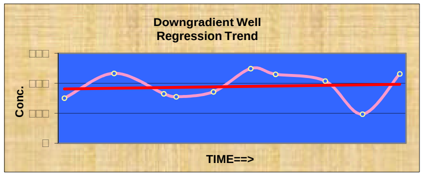
MW 4



-Sq = 0 2 97

[illegible] 0 2 71

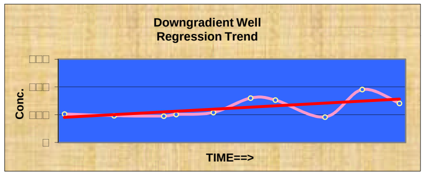
MW 5



-Sq = 0 0 12

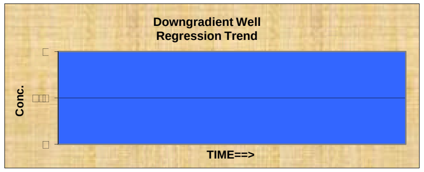
[illegible] 0 0 89

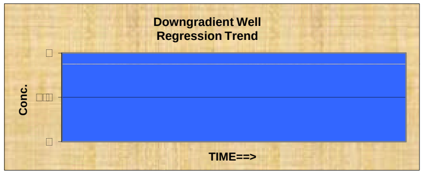
MW 6



-Sq [illegible] 0 3 6

[illegible] 0 1 04





Groundwater Data and Analysis Summary for Conductivity

[illegible]: [illegible]

Fa lity [illegible]:	Rappahann ck [illegible] WTF		
[illegible]	VA009151	Da e:	1/ 7 2 12
[illegible]	[illegible]	[illegible]	umoh /cm
[illegible]		MW [illegible]	
[illegible]		MW [illegible]	
[illegible] ell [illegible]		MW [illegible]	
[illegible] ell [illegible]		MW 0	
[illegible] ell [illegible]			
[illegible] ell [illegible]			

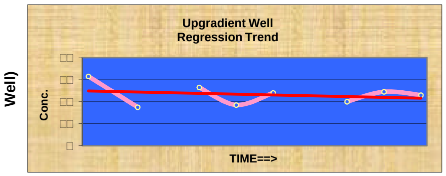
	[illegible] o ness [illegible] % [illegible]	Significant difference from Upgradient Well?	Tren An l si	
			[illegible].	Sl e
MW [illegible]	[illegible] Use [illegible]	[illegible]	0. 724	0. 1 8
[illegible]	[illegible] Use [illegible]	[illegible]	0. 961	. 239
[illegible] 0	[illegible] Use [illegible]	[illegible]	0. 132	0. 892

Pl c [illegible] bov [illegible]
[illegible] se [illegible]

	[illegible]	[illegible]	[illegible]	[illegible]	MW [illegible]
	3 5 2 09	3	44	9	8
	7 7 2 09	5	06	5	2
	1 3 20 9		53	8	10
	1 2 20 9	3	15	6	3
	3 3 2 10	7	34	4	1
	6 3 2 10	8	72	5	1
	8 4 2 10		73	1 2	73
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3 2 2 11	9	72	5	7
	6 2 2 11	6	62	6	2
	?	[illegible]	02. 1	0 43	2 . 1
	?	6 38	20. 0	6 90	1 . 0
	Is [illegible] 3 [illegible]? ?	ES	Y S	YE	**NO**

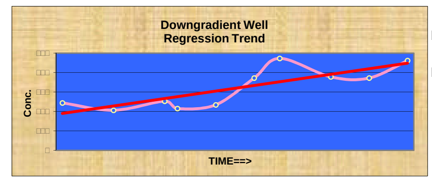
Note: he ompa on of t e ean [illegible] imes he andard [illegible] ay [illegible] det ine [illegible] is a t istica y ignif can change in he [illegible] of [illegible] et [illegible] ny [illegible] bove [illegible] NO , [illegible] ay [illegible] udden inc ase [illegible] dec a e [illegible] t e arame er. [illegible] hould [illegible] nd ot bas [illegible] any [illegible] dec ions regarding he [illegible]

MW 8 (Upgradient Well)



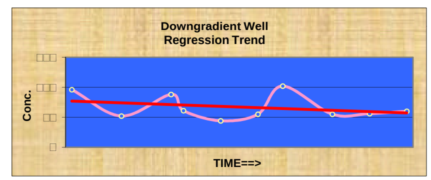
-Sq = 0 0 51
[illegible] -0 8

MW 7



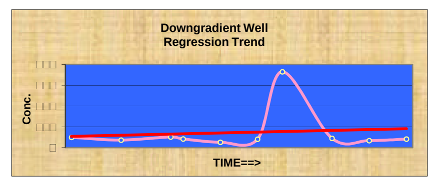
-Sq = 0 6 24
[illegible] 0 3 58

MW 9

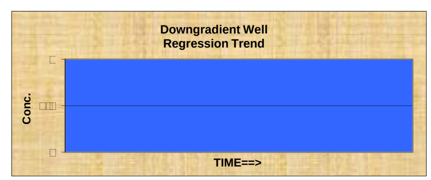


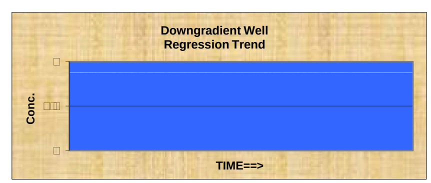
-Sq = 0 0 61
[illegible] -0 3

MW 10



-Sq 0 0 3
[illegible] 0 0 92





Groundwater Data and Analysis Summary for Nitrate-Nitrogen

Fa ility :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]	MW		
[illegible]	MW		
ell	MW		
ell			
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Tren An si	
			[illegible]	Sl e
MW	Use	[illegible]	0. 149	0. 0 1
[illegible]	Use	[illegible]	0. 781	. 001

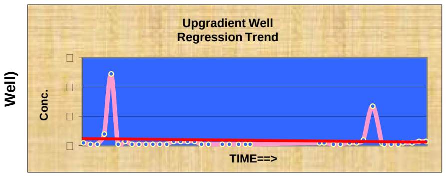
Pl c bov

se

[illegible]	[illegible]	[illegible]	[illegible]
2 8 19 9	.	.	0 4
5 4 1 99	.	.	0 4
8 2 1 99	.	.	0 1
1 1 19 9	.	.	0 6
2 9 2 00	.	.	0 5
5 0 20 0	.	.	0 8
8 1 2 00	.	.	0 5
[illegible]	[illegible]	[illegible]	[illegible]
2 1 2 01	.	.	1 5
5 3 2 01	.	.	0 8
8 2 2 01	.	.	0 5
1 2 20 1	.	.	0 5
2 4 2 02	.	.	0 5
5 6 2 02	.	.	0 1
8 5 2 02	.	.	0 2
1 4 20 2	.	.	0 3
2 5 2 03	.	.	0 4
5 6 2 0	.	.	0
[illegible]	[illegible]	[illegible]	[illegible]
2 5 2004	0 1	[illegible]	0 5
5 4 2004	0 1	[illegible]	0 2
9 9 2004	0 1	[illegible]	0 6
1 / / 0 4	0 1	[illegible]	0 1
2 9 2005	0 1	[illegible]	0 1
8 7 2007	0 2	[illegible]	0 1
1 / / 0 7	0 2	[illegible]	0 1
2 5 2008	0 1	[illegible]	0 1
5 6 2008	0 1	[illegible]	0 2
9 9 2 0	0	[illegible]	0
1 / 0 8	0 2	[illegible]	0 1
3 5 2009	0 4	[illegible]	0 1
7 7 2009	2 7	[illegible]	0 1
[illegible]	[illegible]	[illegible]	[illegible]
1 / / 0 9	0 1	[illegible]	0 1
3 3 2010	0 1	[illegible]	0 1
6 3 2010	0 1	[illegible]	0 2
8 4 2010	0 2	[illegible]	0 3
1 / / 0 0	0 2	[illegible]	0 2
3 2 2011	0 3	[illegible]	0 4
6 2 2 1	0	[illegible]	0
?	[illegible]	0 4	0
?	[illegible]	0 5	0
Is 3 ? ?	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

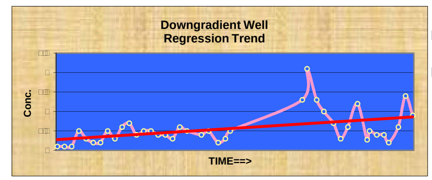
MW 3 (Upgradient Well)



-Sq = 0 0 86

-0 0

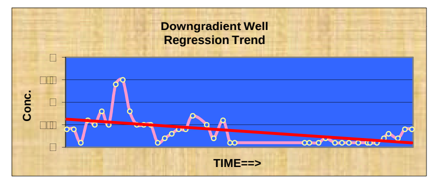
MW 1



-Sq = 0 2 49

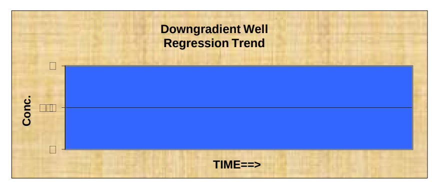
0 0 01

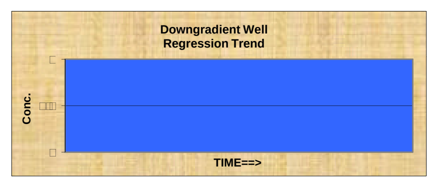
MW 2

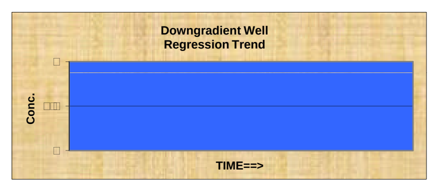


-Sq = 0 2 81

-0 0







Groundwater Data and Analysis Summary for Nitrate-Nitrogen

Fa lity :	Rappahann ck WTF		
[illegible]	VA0091511	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW	
ell			
[illegible]			

	o ness %	Significant difference from Upgradient Well?	Trend An l si	
			[illegible]	Sl e
MW	se T es	[illegible]	0. 324	0. 0 1
MW	Use	[illegible]	0. 407	. 002
MW	T es	[illegible]	0. 050	0. 000

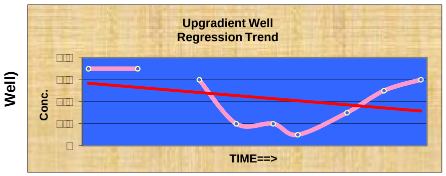
Pl c bov
se

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 5 2 09	[illegible]	[illegible]	0 3	[illegible]
7 7 2 09	[illegible]	[illegible]	0 2	[illegible]
1 3 20 9		[illegible]	0 1	[illegible]
1 2 20 9	[illegible]	[illegible]	0 1	[illegible]
3 3 2 10	[illegible]	[illegible]	0	0 01
6 3 2 10	[illegible]	[illegible]	0 1	[illegible]
8 4 2 10	[illegible]	[illegible]	0 1	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	[illegible]	[illegible]	0 1	[illegible]
6 2 2 11	[illegible]	[illegible]	0 1	[illegible]

?	[illegible]	0 2	0	[illegible]
?	[illegible]	0 2	0	[illegible]
Is 3 ? ?	**NO**	**NO**	**NO**	ES

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

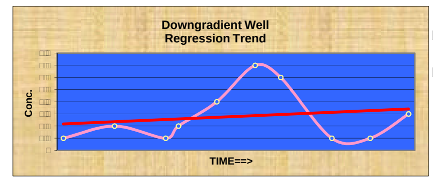
MW 8 (Upgradient Well)



-Sq = 0 1 02

-0 0

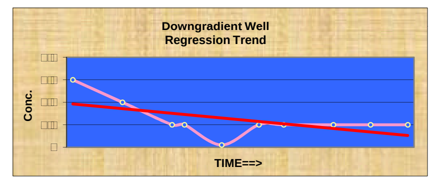
MW 4



-Sq = 0 0 24

0 0 01

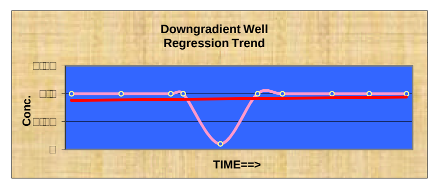
MW 5



-Sq = 0 3 07

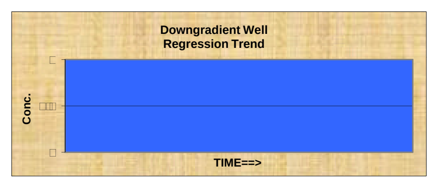
-0 0

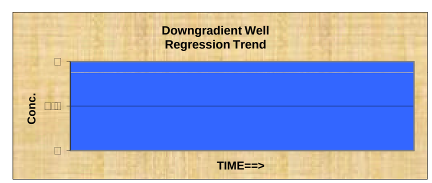
MW 6



-Sq 0 0 5

0 0 00





Groundwater Data and Analysis Summary for Nitrate-Nitrogen

[illegible]:

Facility:	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW 0	
ell			
ell			

	[illegible] o ness %	Significant difference from Upgradient Well?	Tren An l si	
			[illegible]	Sl e
MW	se T es	[illegible]	0. 442	002
[illegible]	T es	[illegible]	0. 426	0. 013
0	Use	[illegible]	0. 789	. 019

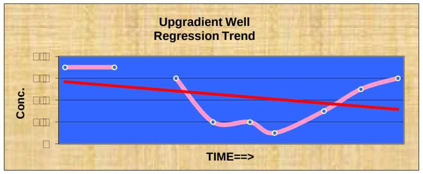
Pl c bov
se

[illegible]	[illegible]	[illegible]	[illegible]	MW
3 5 2 09	.	.	0 5	.
7 7 2 09	.	.	1 1	.
1 3 20 9		.	0 6	.
1 2 20 9	.	.	1 9	.
3 3 2 10	.	.	1 7	.
6 3 2 10	.	0 01	1 7	.
8 4 2 10	.	0 01	0 5	0 01
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	.	.	1 8	.
6 2 2 11	.	.	1 9	.

?	[illegible]	0 1	0	[illegible]
?	[illegible]	0 1	1	[illegible]
Is 3 ? ?	**NO**	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

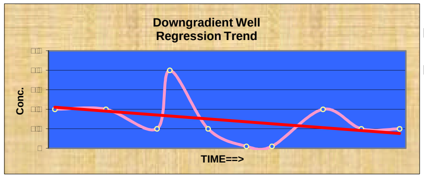
MW 8 (Upgradient Well)



-Sq = 0 1 02

-0 0

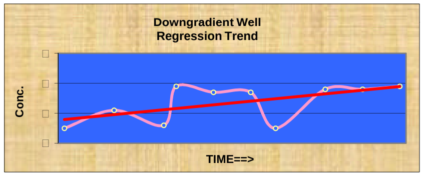
MW 7



-Sq = 0 1 42

-0 0

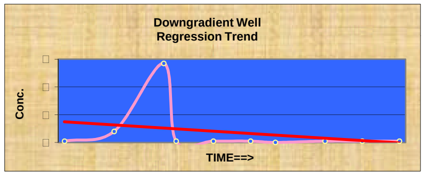
MW 9



-Sq = 0 3 26

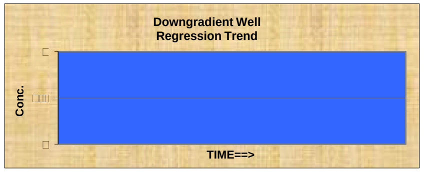
0 0 13

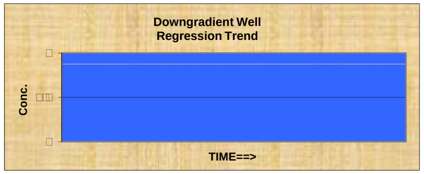
MW 10



-Sq 0 0 8

-0 1





Groundwate Data and Analysis Summary for

:

Fa lity :	Rappahann ck WTF		
	VA0091511	Da e:	11 14 011
		MW	
		MW	
ell		MW	
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Trend An l si	
			.	Sl e
MW	Use		0. 244	001
MW	Use		0. 033	0. 000

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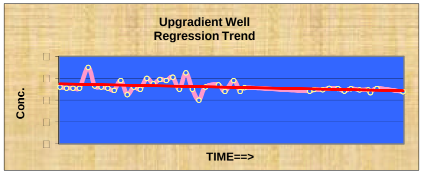
se

1 2 19 8	.	.	5 5
4 3 19 8	.	.	
7 4 19 8	.	.	5 1
0 1 / 99	.	.	5 6
2 19 9	7	.	6 9
5 4 1 99	.	.	5 4
8 2 1 99	.	.	6 4
2 9 2 00	.	.	5 1
5 0 20 0	.	.	6 1
8 1 2 00	.	.	4 9
1 3 20 0	.	.	5 4
2 1 2 01	5	5	5 5
5 3 2 01	6	.	
8 2 2 01	.	.	5 4
1 2 20 1	.	6	6 4
2 4 2 02	.	.	4 9
5 6 2 0	.	.	5
1 4 20 2	6 5		
2 5 2 03			
5 6 2 03			4 5
8 6 2003	5 2		5 4
2 5 2004	5 4		5 8
5 4 2004	4 8		5 4
9 9 2004	5 8		5 6
1 / / 0 4	4 8		5 2
2 9 2005		6 34	5
8 7 2 0		5 0	
1 / 0 7			5
2 5 2008		5 4	5
5 6 2008		5 6	5 9
1 / 0 8		5 14	5
3 5 2009		5 62	5
7 7 2009			5
1 / 0 9		5 32	5
1 / 0 9		5 12	5
3 3 2010			5 6
3 2 2 1		4 9	

?		0 5	0
?		5 6	5
Is 3 ? ?	ES	Y S	YE

Note: he ompa on of t e ean i es he andard ay is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

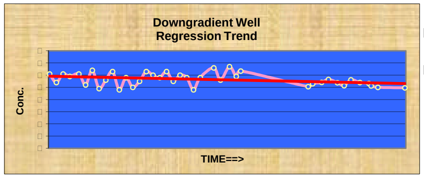
MW 3 (Upgradient Well)



-Sq =
0 1 95

-0 0

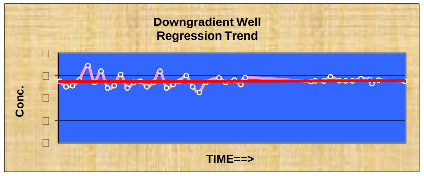
MW 1



-Sq =
0 1 44

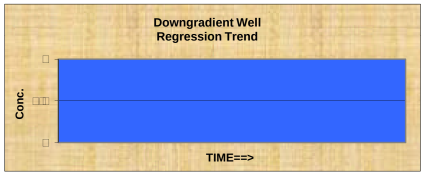
-0 0

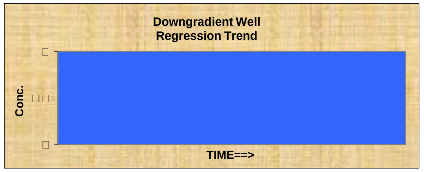
MW 2

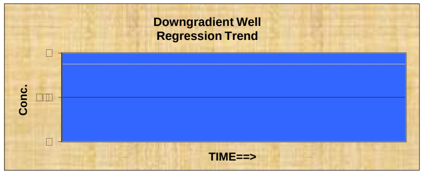


-Sq =
0 0 33

0 0 00







Groundwater Data and Analysis Summary for pH

[illegible]:

Fa lity :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW	
ell			
ell			

	[illegible] o ness %	Significant difference from Upgradient Well?	Tren An l si	
			[illegible]	Sl e
MW	Use	[illegible]	0. 052	002
[illegible]	Use	YES p e R n e	0. 046	. 001
[illegible]	Use	YES p e R n e	0. 253	. 003

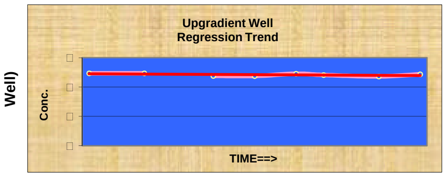
Pl c bov

se

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 5 2 09	4 94	5 09	5	6 13
7 7 2 09	4 94	.	5	.
1 3 20 9		4 84	5 6	6 03
1 2 20 9	4 76	.	5	5 73
3 3 2 10	4 75	4 74	5	5 94
6 3 2 10	4 91			
8 4 2 10	4 82			
[illegible]	[illegible]			
3 2 2 11	4 87	4 91	5	5 93
?	[illegible]	0 1	0	[illegible]
?	[illegible]	4 8	5	[illegible]
Is 3 ? ?	ES	Y S	YE	ES

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

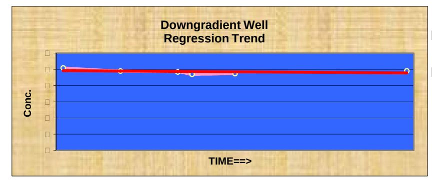
MW 8 (Upgradient Well)



-Sq = 0 2 56

-0 0

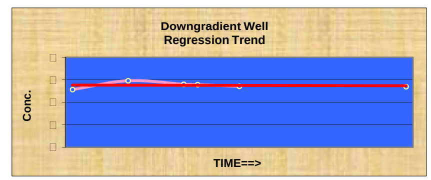
MW 4



-Sq = 0 1 52

-0 0

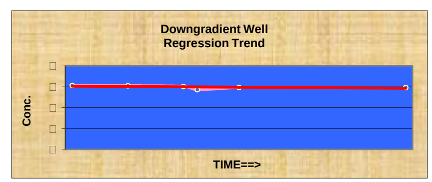
MW 5



-Sq = 0 0 46

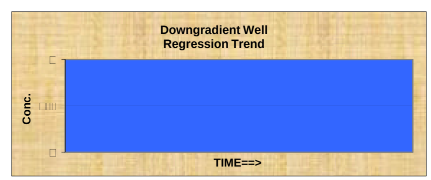
-0 0

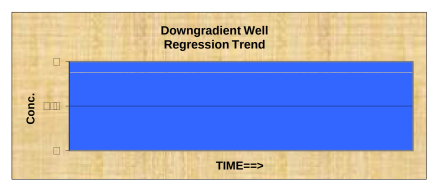
MW 6



-Sq 0 2 5

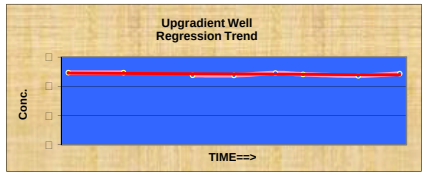
-0 0



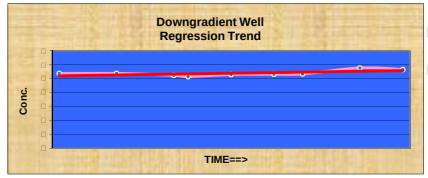


	[illegible]	Significant difference from Upgradient Well?	[illegible]	
			[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

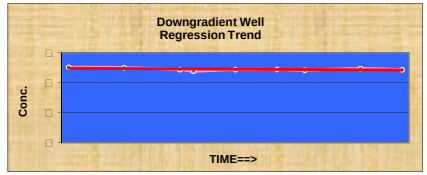
MW 8 (Upgradient Well)



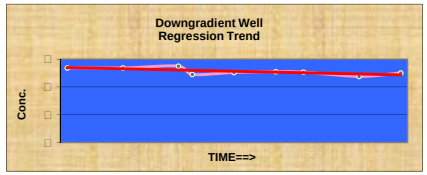
MW 7

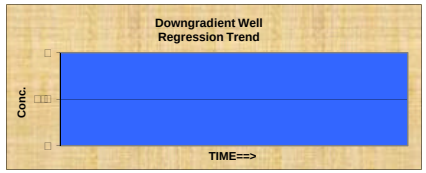


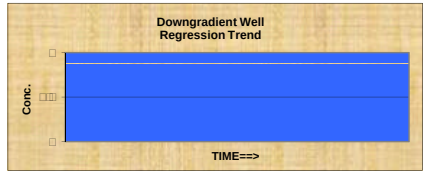
MW 9



MW 10







Groundwater ata and Analysis Summary for Total Organic Carbo

Fa lity :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell			
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Tren An l si	
			.	Sl e
MW	se T es	[illegible]	0. 731	0. 0 7
[illegible]	T es	[illegible]	0. 669	0. 056

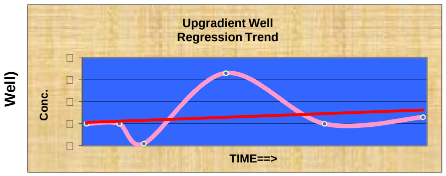
Pl c bov

se

[illegible]	[illegible]	[illegible]	[illegible]
1 9 20 7	1	.	4 8
2 5 2 08	1	.	5 3
5 6 2 08	.	.	4 9
3 5 2 09	.	.	6 6
3 3 2 10	1	.	9 7
3 2 2 11	.	.	1
?	[illegible]	1 6	2
?	[illegible]	3 1	7
Is 3 ? ?	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

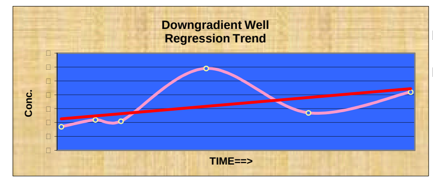
MW 3 (Upgradient Well)



-Sq = 0 0 13

0 0 04

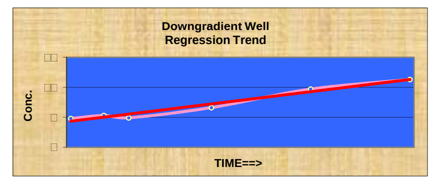
MW 1



-Sq = 0 2 31

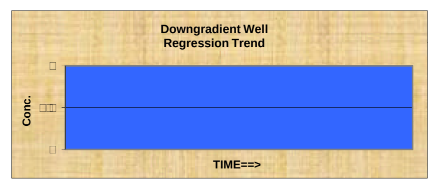
0 0 17

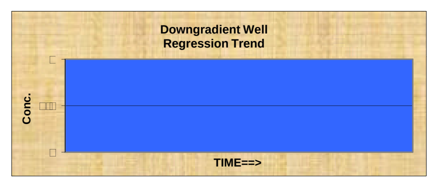
MW 2

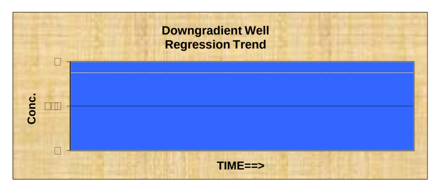


-Sq = 0 9 69

0 0 56







Groundwater Data and Analysis Summary for Total Organic Carbo[illegible]

[illegible]: [illegible]

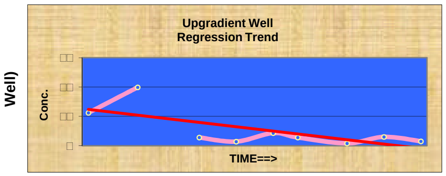
Fa[illegible]lity [illegible]:	Rappahann[illegible]ck [illegible] WTF		
[illegible]	VA0091511	Da[illegible]e:	11 14 [illegible]011
[illegible]	[illegible]	[illegible]	mg [illegible]
[illegible]	MW [illegible]		
[illegible]	MW [illegible]		
[illegible] ell [illegible]	MW [illegible]		
[illegible] ell [illegible]	MW [illegible]		
[illegible] ell [illegible]			
[illegible]			

	[illegible] o[illegible]ness [illegible] % [illegible]	Significant difference from Upgradient Well?	Trend An[illegible]l[illegible]si[illegible]	
			[illegible].	Sl[illegible]e
MW [illegible]	[illegible] se [illegible] T[illegible]es [illegible]	[illegible]	0. [illegible]005	0. [illegible]0[illegible]6
MW [illegible]	[illegible] Use [illegible]	[illegible]	0. [illegible]147	[illegible]. [illegible]004
MW [illegible]	[illegible] T[illegible]es [illegible]	[illegible]	0. [illegible]879	[illegible]. [illegible]012

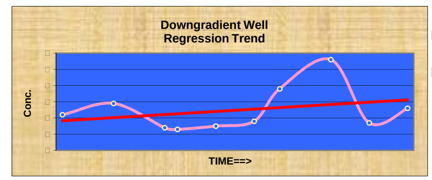
Pl[illegible]c [illegible]bov[illegible]
[illegible]se [illegible]

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	3 5 2 09	11 [illegible]	[illegible]	4 6	[illegible]
[illegible]	7 7 2 09	19 [illegible]	[illegible]	2 7	[illegible]
[illegible]	1 [illegible]3 20 [illegible]9		[illegible]	3 6	[illegible]
[illegible]	1 [illegible]2 20 [illegible]9	[illegible]	[illegible]	2 1	[illegible]
[illegible]	3 3 2 10	[illegible]	[illegible]	2 7	[illegible]
[illegible]	6 3 2 10	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	8 4 2 10	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	3 2 2 11	3	[illegible]	3 3	[illegible]
[illegible]	6 2 2 11	[illegible]	[illegible]	2 9	[illegible]
[illegible]?		[illegible]	1 3 [illegible]	0 [illegible]	[illegible]
[illegible]?		[illegible]	2 4 [illegible]	3 [illegible]	[illegible]
Is [illegible] 3 [illegible]? ?		**NO**	**NO**	YE[illegible]	[illegible]ES

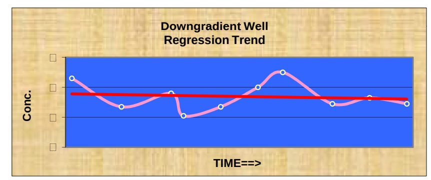
Note: [illegible]he [illegible]ompar[illegible]on of t[illegible]e [illegible]ean [illegible]imes [illegible]he [illegible]andard [illegible] ay [illegible]det[illegible]ine [illegible]is a [illegible]t[illegible]istica[illegible]y [illegible]ignif cant change in [illegible]he [illegible] of [illegible]et [illegible]ny of [illegible]bove [illegible]NO[illegible], [illegible] ay [illegible]udden inc[illegible]ase [illegible]oncentrat[illegible]n [illegible]t[illegible]e [illegible]arame[illegible]er. [illegible]hould [illegible]nd [illegible]ot [illegible]bas [illegible]any [illegible]dec[illegible]ions regarding [illegible]he [illegible]



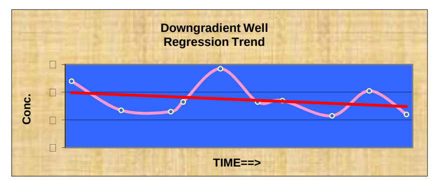
[illegible]-Sq[illegible]= 0 4 [illegible]55
[illegible] -0 [illegible]6[illegible]



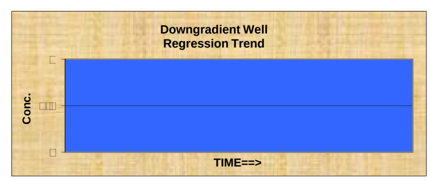
[illegible]-Sq[illegible]= 0 1 [illegible]05
[illegible] 0 0 [illegible]16

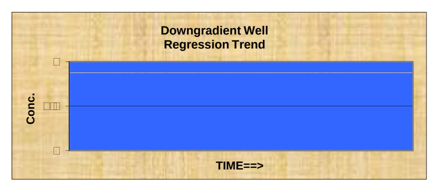


[illegible]-Sq[illegible]= 0 0 [illegible]47
[illegible] -0 [illegible]0[illegible]



[illegible]-Sq [illegible] 0 0 [illegible]7[illegible]
[illegible] -0 [illegible]1[illegible]





Groundwater ata and Analysis Summary for Total Organic Carbo

:

Fa lity :	Rappahann ck WTF		
	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW 0	
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Tren An l si	
			.	Sl e
MW	Use	[illegible]	0. 808	107
[illegible]	Use	[illegible]	0. 078	. 078
0	T es	[illegible]	0. 562	. 056

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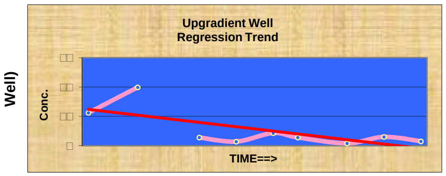
[illegible]	[illegible]	[illegible]	[illegible]	MW
3 5 2 09	11	[illegible]	1	10
7 7 2 09	19	.	3 8	10
1 3 20 9		.	5 2	.
1 2 20 9	.	.	2 6	.
3 3 2 10	.	.	2 5	11
6 3 2 10	.	.	2 1	.
8 4 2 10	.	10	7 3	13
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	3	.	3 3	.
6 2 2 11	.	.	2 9	.
?	[illegible]	4 6	3	[illegible]
?	[illegible]	6 2	4	[illegible]
Is 3 ? ?	**NO**	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

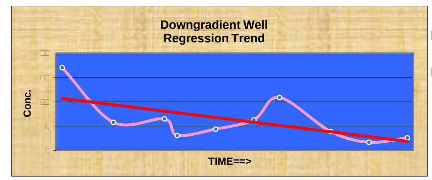
MW 8 (Upgradient Well)



-Sq =	0 4 55

-0 6

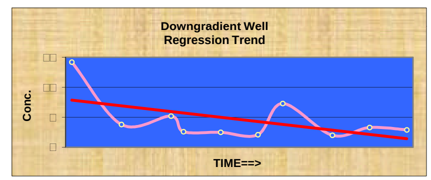
MW 7



-Sq =	0 3 08

-0 0

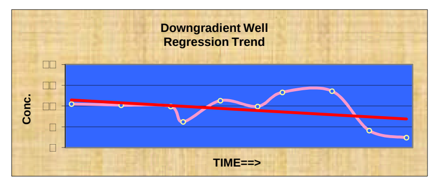
MW 9



-Sq =	0 3 78

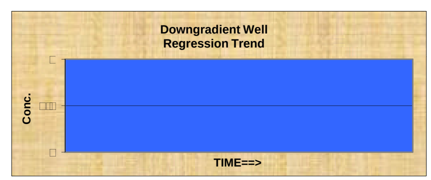
-0 7

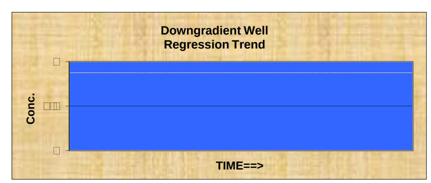
MW 10



-Sq	0 1 6

-0 5





Groundwate Data and Analysis ummary or Total Phosphoru

Fa lity :	Rappahann ck WTF		
[illegible]	VA0091511	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell			
ell			
[illegible]			

	o ness %	Significant difference from Upgradient Well?	Trend An l si	
			[illegible]	Sl e
MW	Use	[illegible]	0. 696	0. 0 3
MW	Use	[illegible]	0. 506	0. 012

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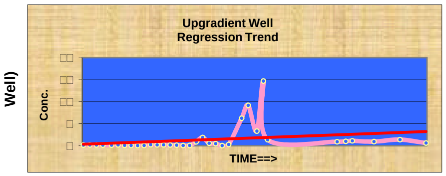
se

[illegible]	[illegible]	[illegible]	[illegible]
7 9 1996	0 16	0 04	0
1 / 9 6	0 18	0 01	0
3 9 7	0 19	0 04	0
4 9 7	0 16	0 01	0
7 8 1997	0 15	0 03	0
0 13/ 99	0 21	0 06	0
1 2 19 8	0 11	0 02	0
[illegible]	[illegible]	[illegible]	[illegible]
7 4 19 8	0 06	0 08	0
0 1 / 99	0 08	0 06	0
2 8 19 9	0 26	0 05	0
5 4 1 99	0 21	0 24	0
8 2 1 99	0 22	0 12	0
1 1 19 9	0 18	0 18	0
2 9 2 00	0 15	0 19	0
5 0 20 0	0 07	0 07	0
8 1 2 00	0 09	0 08	0
1 3 20	.	0 0	0.
[illegible]	[illegible]	[illegible]	[illegible]
5 3 2 01	[illegible]	2 2	6
8 2 2 01	0 5	0 9	2
1 2 20 1	[illegible]	3 8	2
2 4 2 02	0 3	0 2	1
5 6 2 02	[illegible]	4 6	9
8 5 2 02	9 2	4 4	6 6
1 4 20 2	[illegible]	[illegible]	4 55
2 5 2 03	4 72	2 7	2 72
5 6 2 03	[illegible]	1 4	5 81
8 6 2 0	[illegible]	5 7	9 9
2 5 2004	[illegible]	1 7	5 75
5 4 2004	[illegible]	2 3	4
9 9 2004	[illegible]	2 2	4 23
[illegible]	[illegible]	[illegible]	[illegible]
2 9 2005	[illegible]	1 05	1 3
1 / 0 7	[illegible]	0 23	0
2 5 2008	2 6	0 26	2
5 6 2008	[illegible]	0 19	2
3 5 2009		[illegible]	2
3 3 2010	[illegible]	0 14	0
3 2 2 1	[illegible]	[illegible]	[illegible]
?	[illegible]	1 6	7
?	[illegible]	1 2	4
Is 3 ? ?	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

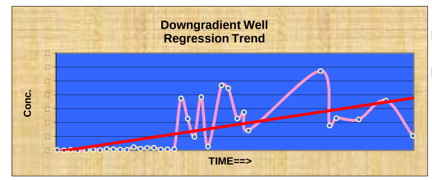
MW 3 (Upgradient Well)



-Sq = 0 0 29

0 0 04

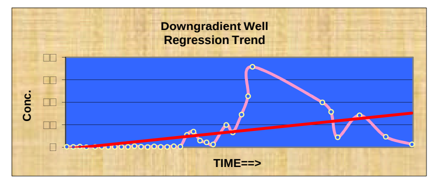
MW 1



-Sq = 0 0 96

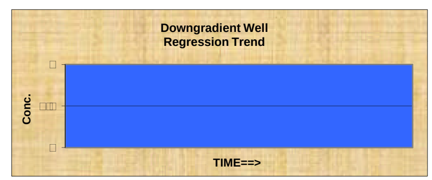
0 0 03

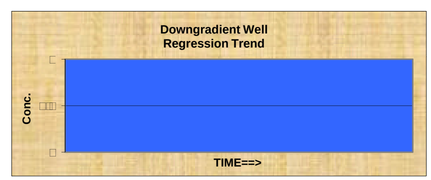
MW 2



-Sq = 0 0 06

0 0 12





Groundwater Data and Analysis Summary for Total Phosphoru

Fa lity :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW	
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Tren An si	
			.	Sl e
MW	se T es	[illegible]	0. 350	002
[illegible]	T es	[illegible]	0. 913	. 013
[illegible]	T es	[illegible]	0. 720	. 044

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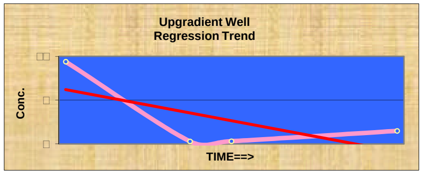
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 5 2 09	.	0 13	0 6	8 09
1 2 20 9	0 29	0 78	2	.
3 3 2 10	0 31	0 07	0 1	1 23
3 2 2 11	1 49	.	0 1	4 24
?	[illegible]	0 3	1	[illegible]
?	[illegible]	0 2	0	[illegible]
Is 3 ? ?	**NO**	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

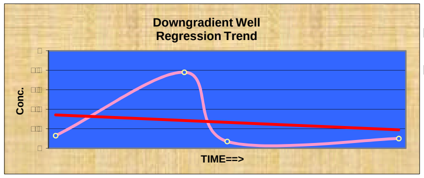
MW 8 (Upgradient Well)



-Sq = 0 4 53

-0 9

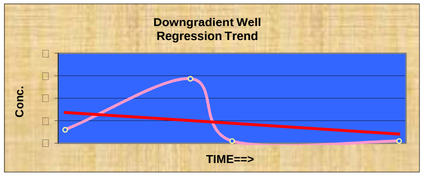
MW 4



-Sq = 0 0 50

-0 0

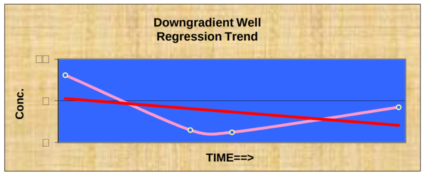
MW 5



-Sq = 0 0 13

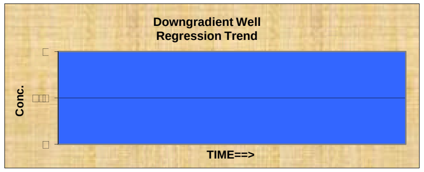
-0 1

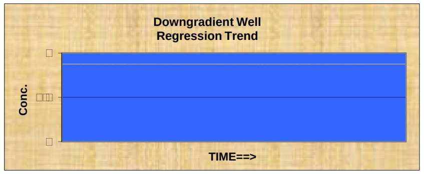
MW 6



-Sq 0 1 2

-0 4





Groundwate Data and Analysis ummary or Total Phosphoru

Fa lity :	Rappahann ck WTF		
	VA0091511	Da e:	11 14 011
			mg
		MW	
		MW	
ell		MW	
ell		MW 0	
ell			

	o ness %	Significant difference from Upgradient Well?	Trend An l si	
				Sl e
MW	Use		0. 809	201
MW	T es		0. 688	. 196
	T es		0. 100	. 004

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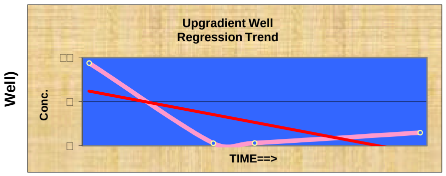
				MW
3 5 2 09	.	1 . 1	6 83	0 35
1 2 20 9	0 29	0 33	2	.
3 3 2 10	0 31	0 25	0	0 11
3 2 2 11	1 49	0 14	1	.
?		7 9	7	
?		4 2	5	
Is 3 ? ?	**NO**	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

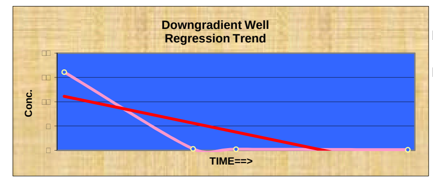
MW 8 (Upgradient Well)



-Sq = 0 4 53

-0 9

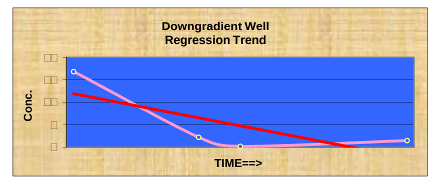
MW 7



-Sq = 0 5 09

-0 0

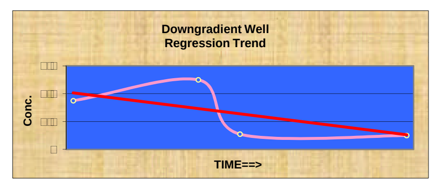
MW 9



-Sq = 0 5 88

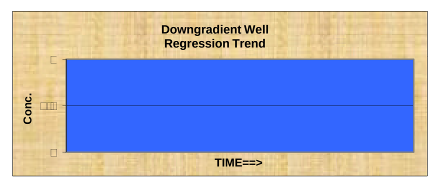
-0 9

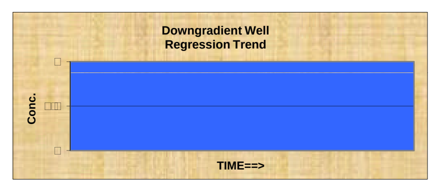
MW 10



-Sq 0 4 0

-0 0





Groundwater Data and Analysis Summary for otal Recoverable So ium

Fa lity :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]	MW		
[illegible]	MW		
ell	MW		
ell			
ell			
ell			

	o ness %	Significant difference from Upgradient Well?	Tren An l si	
			C.	Sl e
MW	Use	[illegible]	0. 634	0. 1 9
[illegible]	Use	[illegible]	0. 697	0. 111

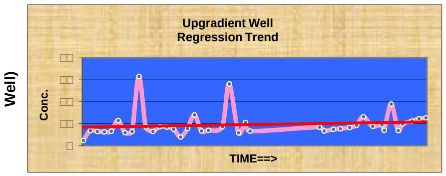
Pl c bov
se

	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2 8 19 9	2 43	6 92	8 85
[illegible]	5 4 1 99	6 89	9 01	2 11
[illegible]	8 2 1 99	.	8 42	8
[illegible]	1 1 19 9	6 31	1 . 8	5 18
[illegible]	2 9 2 00	6 62	1 . 4	7 93
[illegible]	5 0 20 0	11	1 . 5	6 39
[illegible]	8 1 2 00	5 95	1 . 6	2 74
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2 1 2 01	. 5	2 . 5	0 31
[illegible]	5 3 2 01	8 56	1 . 8	0 27
[illegible]	8 2 2 01	6 54	1 . 9	8 39
[illegible]	1 2 20 1	8 64	1 . 4	6
[illegible]	2 4 2 02	8 54	1 . 9	6 77
[illegible]	5 6 2 02	7 51	1 . 7	5 74
[illegible]	8 5 2 02	3 99	1 . 6	2 74
[illegible]	1 4 20 2	.	1 . 3	2 62
[illegible]	2 5 2 03	. 3	1 . 9	7 81
[illegible]	5 6 2 0	6 7	.	0 2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2 5 2004	[illegible]	1 2	5 08
[illegible]	5 4 2004	.	22.	6 .
[illegible]	9 9 2004	5 9	1 1	4 24
[illegible]	1 / / 0 4	.	1 8	8 57
[illegible]	2 9 2005	[illegible]	1 6	4 52
[illegible]	8 7 2007	[illegible]	35.	10 . 2
[illegible]	1 / / 0 7	[illegible]	4 2	3 93
[illegible]	2 5 2008	[illegible]	6 5	7 19
[illegible]	5 6 2008	[illegible]	6 5	5 92
[illegible]	9 9 2 0	[illegible]	4	[illegible]
[illegible]	1 / 0 8	[illegible]	6 4	9 04
[illegible]	3 5 2009	3 16	5 7	4 02
[illegible]	7 7 2009	[illegible]	6 7	8 .
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1 / / 0 9	[illegible]	4 2	6 36
[illegible]	3 3 2010	8 97	6 2	2 66
[illegible]	6 3 2010	[illegible]	4 3	0 15
[illegible]	8 4 2010	[illegible]	3 7	2 52
[illegible]	1 / / 0 0	1 23	3 2	7 97
[illegible]	3 2 2011	.	5 2	1 4
[illegible]	6 2 2 1	2 6	6 .	0 .

	?	[illegible]	2 4	4 10
	?	[illegible]	2 7	6 65
	Is 3 ? ?	**NO**	**NO**	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he

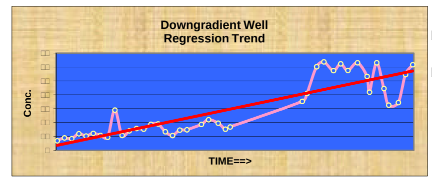
MW 3 (Upgradient Well)



-Sq = 0 0 99

0 0 05

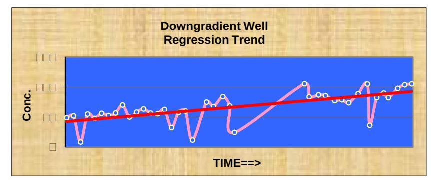
MW 1



-Sq = 0 7 34

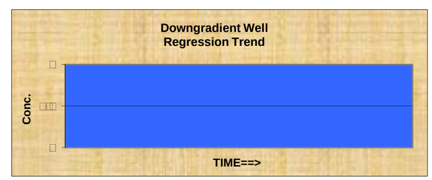
0 0 19

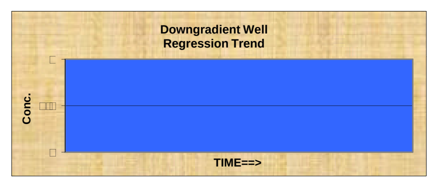
MW 2

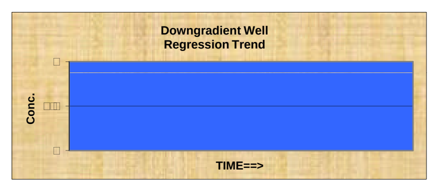


-Sq = 0 4 97

0 0 11







Groundwate Data and Analysis ummary or Total Recoverable Sodium

Fa lity :	Rappahann ck WTF		
[illegible]	VA0091511	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW	
ell			
[illegible]			

	[illegible] o ness %	Significant difference from Upgradient Well?	Trend An l si	
			[illegible].	Sl e
MW	Use	[illegible]	0. 070	0. 0 1
MW	Use	[illegible]	0. 650	0. 356
MW	T es	[illegible]	0. 008	. 005

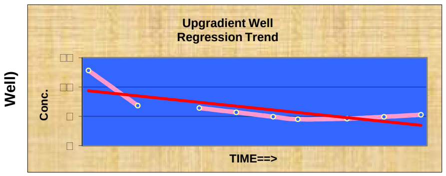
Pl c bov
se

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 5 2 09	. 4	4 87	2 57	.
7 7 2 09	6 85	5 53	10.	. 9
1 3 20 9		4 95	6 79	. 3
1 2 20 9	6 44	4 32	6 74	. 1
3 3 2 10	5 71	5 04	3 49	20
6 3 2 10	4 96	5 06	8 63	. 9
8 4 2 10	4 53	5 03	5 29	. 4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	4 94	4 58	5 33	. 4
6 2 2 11	5 29	5 18	1 4	. 2

?	[illegible]	0 3	3 23	[illegible]
?	[illegible]	5 0	7 99	3 95
Is 3 ? ?	**NO**	Y S	YE	**NO**

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif cant change in he of et ny bove NO , ay udden inc ase oncentr n t e arame er. hould nd ot bas any dec ions regarding he

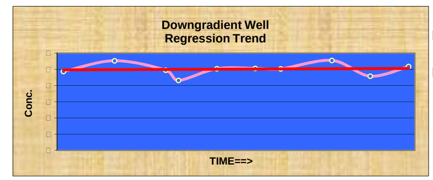
MW 8 (Upgradient Well)



-Sq = 0 5 00

-0 7

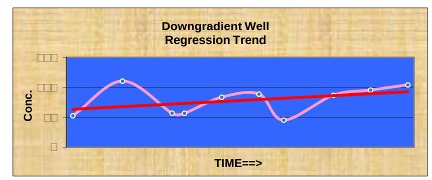
MW 4



-Sq = 0 0 70

0 0 01

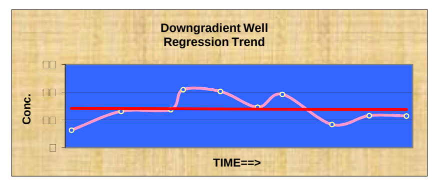
MW 5



-Sq = 0 1 50

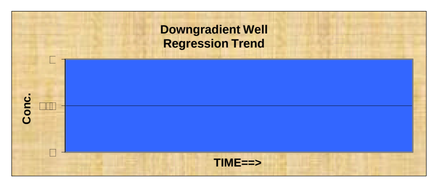
0 0 56

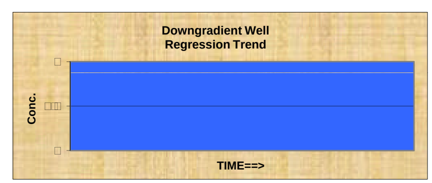
MW 6



-Sq 0 0 0

-0 0





Groundwater Data and Analysis Summary for otal Recoverable Sodium

[illegible]: [illegible]

Fa lity :	Rappahann ck WTF		
[illegible]	VA009151	Da e:	11 14 011
[illegible]	[illegible]	[illegible]	mg
[illegible]		MW	
[illegible]		MW	
ell		MW	
ell		MW 0	
ell			
ell			

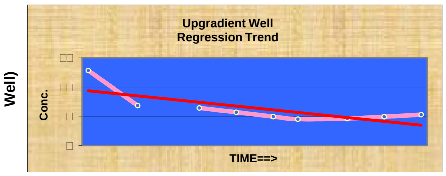
	o ness %	Significant difference from Upgradient Well?	Tren An l si	
			[illegible]	Sl e
MW	se T es	[illegible]	0. 641	0. 8 3
[illegible]	T es	[illegible]	0. 158	. 094
0	Use	[illegible]	0. 770	. 033

Pl c bov
se

[illegible]	[illegible]	[illegible]	[illegible]	MW
3 5 2 09	. 4	5 . 3	7 54	12
7 7 2 09	6 85	5 . 1	9	.
1 3 20 9		5 . 8	4 58	. 5
1 2 20 9	6 44	4 . 7	2	. 2
3 3 2 10	5 71	6 . 4	6	9 14
6 3 2 10	4 96	73	7	.
8 4 2 10	4 53		0 24	6 83
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 2 2 11	4 94	9 . 1	4	8 41
6 2 2 11	5 29	20	7	8 62

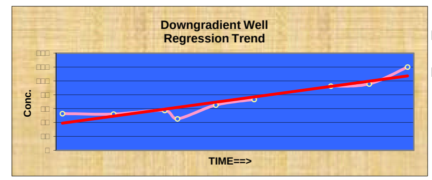
?	[illegible]	2 9	4	[illegible]
?	[illegible]	7 5	8	[illegible]
Is 3 ? ?	**NO**	**NO**	**NO**	ES

Note: he ompa on of t e ean imes he andard ay det ine is a t istica y ignif can change in he of et ny bove NO , ay udden inc ase dec a e t e arame er. hould nd ot bas any dec ions regarding he



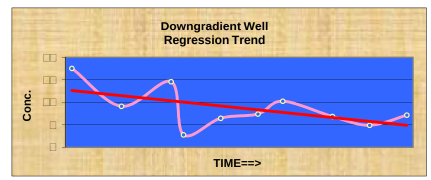
-Sq = 0 5 00

-0 7



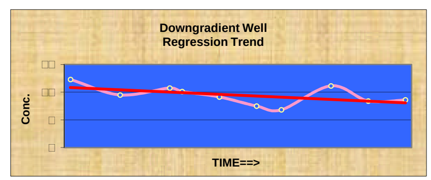
-Sq = 0 8 41

0 0 33



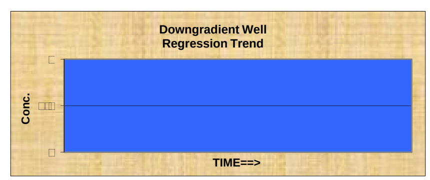
-Sq = 0 3 58

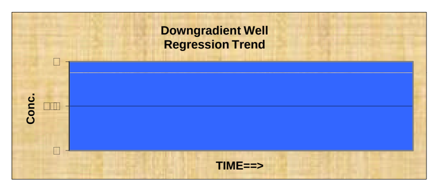
-0 9



-Sq 0 2 7

-0 3





Groundwater Data and Analysis Summary for Total Dissolved Solid [illegible]

[illegible]: [illegible]

Fa[illegible]lity [illegible]:	Rappahann[illegible]ck [illegible] WTF		
[illegible]	VA0091511	Da[illegible]e:	11 [illegible]14 [illegible]011
[illegible]	[illegible]	[illegible]	mg [illegible]
[illegible]		MW [illegible]	
[illegible]		MW [illegible]	
[illegible] ell [illegible]		MW [illegible]	
[illegible] ell [illegible]			
[illegible] ell [illegible]			
[illegible]			

	[illegible] o[illegible]ness [illegible] % [illegible]	Significant difference from Upgradient Well?	Trend An[illegible]l[illegible]si[illegible]	
			[illegible].	Sl[illegible]e
MW [illegible]	[illegible]se [illegible] T[illegible]es [illegible]	[illegible]	0. [illegible]471	0. [illegible]2[illegible]2
MW [illegible]	[illegible] T[illegible]es [illegible]	[illegible]	0. [illegible]066	0. [illegible]063

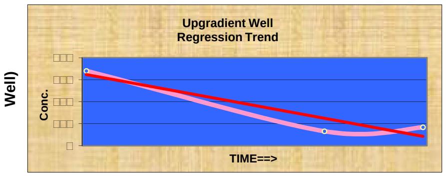
Pl[illegible]c [illegible]bov[illegible]

[illegible]se [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
1[illegible]9[illegible]20[illegible]7	34[illegible]	[illegible]66	1[illegible]3
3[illegible]3[illegible]2[illegible]10	[illegible]6	[illegible]78	2[illegible]0
3[illegible]2[illegible]2[illegible]11	[illegible]4	[illegible]64	1[illegible]8
[illegible]?	1[illegible]. [illegible]6	6[illegible]5	[illegible]9[illegible]36
[illegible]?	1[illegible]. [illegible]3	[illegible]02. [illegible]7	18[illegible]. [illegible]7
Is [illegible] 3[illegible]? ?	**NO**	Y[illegible]S	YE[illegible]

Note: [illegible]he [illegible]ompa[illegible]on of t[illegible]e [illegible]ean [illegible]imes [illegible]he [illegible]andard [illegible] ay [illegible]det[illegible]ine [illegible]is a [illegible]t[illegible]istica[illegible]y [illegible]ignif cant change in [illegible]he [illegible] of [illegible]et [illegible]ny [illegible]bove [illegible]NO[illegible], [illegible] ay [illegible]udden inc[illegible]ase [illegible]oncentr[illegible]n [illegible]t[illegible]e [illegible]arame[illegible]er. [illegible]hould [illegible]nd [illegible]ot [illegible]bas [illegible]any [illegible]dec[illegible]ions regarding [illegible]he [illegible]

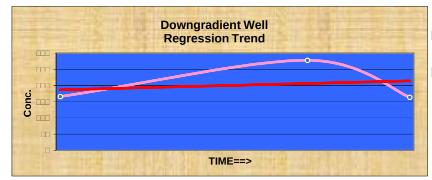
MW 3 (Upgradient Well)



[illegible]-Sq[illegible]= 0[illegible]8[illegible]35

[illegible] -0 [illegible]6[illegible]

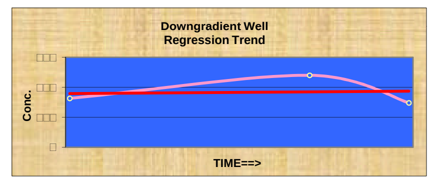
MW 1



[illegible]-Sq[illegible]= 0 0[illegible]71

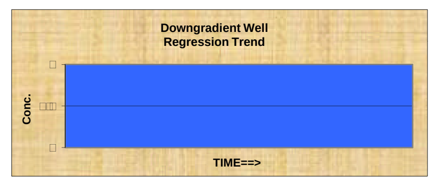
[illegible] 0 0[illegible]22

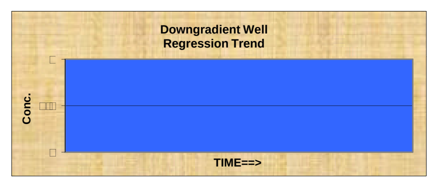
MW 2

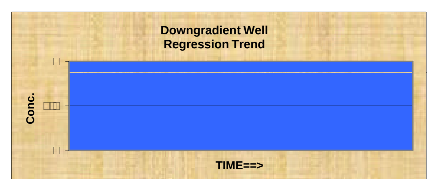


[illegible]-Sq[illegible]= 0 0[illegible]66

[illegible] 0 0[illegible]63







Attachment H

Flow Frequency Memo

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT:

TO:

FROM:

DATE:

COPIES:

Outfall 001:

Hammond, Andrew (DEQ)

From:
Sent:
To:
Cc:
Subject:

1

Hammond, Andrew (DEQ)

From:
Sent:
To:
Cc:
Subject:

1